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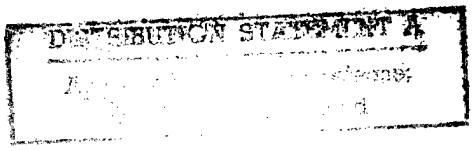
West Europe Report

SCIENCE AND TECHNOLOGY



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20 March 1985

WEST EUROPE REPORT

SCIENCE AND TECHNOLOGY

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AEROSPACE

BRIEFS

FRANCE-CHINA AGREEMENT--Research is continuing after the successful launching of the Ariane rocket 48 hours ago. Today an agreement was signed between France and China, one for a 5-year duration, renewable, which ratifies the exchanges of skills between France and China. China has a Ministry of Space Industry, and the French-Chinese agreement was signed with the deputy minister this evening. It is a framework agreement which provides for exchanges of information and technicians. It seems that the Chinese are preparing a minuscule shuttle for two astronauts. No doubt we shall know more about it in September after Hubert Curien, the French minister of research, attends the firing of a Chinese rocket. The invitation was extended to him in Kourou. /Excerpts/ /Paris Domestic Service in French 1800 GMT 11 Feb 85/

CSO: 3698/262

BIOTECHNOLOGY

STATUS OF RESEARCH IN EUROPEAN ASSOCIATION FOR BIOTECHNOLOGY

Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German
18 Jan 85 p 7

[Excerpts] Scha. FRANKFURT -- Biotechnology is taking on an increasingly fundamental importance for agriculture and the food industry, for forestry, public health, the pharmacological industry and for the larger sectors of the chemical industry. Although Europe can compete in all key areas, i.e., in molecular and cellular biology, microbiology, process technology, and fermentation science, there are more and more indications that because of its fragmented market and complex political machinery the European Community has to make a great effort to maintain its position in the race for commercialization.

The Federal Republic of Germany was one of the first countries to recognize the importance of this promising technology, and has committed itself to this field at an early stage within the framework of the European Association for Biotechnology, which currently counts 49 scientific enterprises from 18 European countries as its members. German research work is concentrated in two main centers in Braunschweig and Julich and in a number of other public and private institutions including the Technical University of Berlin.

Hoechst AG, the world's largest producer of pharmaceutical products, in particular antibiotics, has also done pioneering work in the production of single-cell protein for human consumption. Boehringer Mannheim GmbH is leading in the field of new biochemicals - restriction enzymes and oligonucleotides - which are used in genetic engineering. The pharmaceutical company Boehringer Ingelheim produces specialty chemicals through fermentation (citric acid). Bayer AG, the world's second largest producer of pharmaceutical products, applies enzymology to the production of semi-synthetic penicillins. Schering AG in Berlin uses microbial transformation in the production of steroid hormones. And finally, Degussa AG produces aminoacids as an animal food using immobilized biocatalysts. In addition, approximately 20 other major companies are active in this field.

Strongest Research Base in Great Britain

Among the countries of the European Community, Great Britain has the strongest research base with biotechnology centers which are leading worldwide. The

institutes of the Medical Research Council such as the Institute for Molecular Biology in Cambridge, and the institutes of the Agricultural and Food Research Council complement major university departments. Another public institute of particular importance for biotechnology is the Centre for Applied Microbiology and Research in Prion Down, which concentrates on fermentation science and where a center for animal cell lines was recently established.

Industrial biotechnology in Great Britain is represented by leading chemical companies, for instance by ICI's "Pruteen" unit for single-cell protein. Glaxo and Beechams are very well known in the field of fermentation for pharmaceuticals, while G. D. Searle and Wellcome deserve mention because of their capabilities in genetic engineering. In agricultural foods, Unilever's successful cloning of oil palm cells must be noted as a breakthrough in applied genetic engineering with a wider practical use. Ranks Hovis McDougall's mycoprotein is another promising innovation in the food sector.

In addition, Great Britain has a number of small venture capital firms with special expertise or fields of application which provide support services or are suppliers to larger companies. Celltech, a company established with joint financing by government and industry, is leading in the field of animal cell cultures and the production of monoclonal antibodies for diagnostic or analytical applications. The company works in close cooperation with the institutes of the Medical Research Council. A similar connection to agricultural institutes provides access to the know-how of Agricultural Genetics Co. Ltd.

After a slow start, France now concentrates the national efforts in biotechnology on four "poles": Toulouse, Compiegne, which as long been well known for its enzyme technology and bioprocess technology, the Institut Pasteur, a private foundation with 50 percent government financing which has expertise in genetic engineering, hybridoma technology, virology, and immunology, and finally Paris-Grignon, location of the newly built Center for Fermentation Technology by INRA, the national institute for agricultural research. It is the special objective of these centers to improve the transfer of scientific knowledge to industry.

Production of Vitamin B 12

In addition to the many multinational companies based in France, the major French firms using biotechnology for fine chemicals and pharmaceuticals include Rhone-Poulenc which produces antibodies and is a world leader in the production of vitamin B 12. They also include the subsidiaries Institut Merieux for vaccines and Genetica for genetics as well as Roussel-Uclaff, a Hoechst subsidiary, for antibodies and steroids. Elf Aquitaine, the mineral oil company, has made the strongest commitment to biotechnology. In the area of human biology, it acquired Sanofi, Clin Midy, Choay, and Institut Pasteur Production. Elf Bioindustries and Elf Bioresearch work on biotechnology developments in the food and agricultural sectors. In addition, there are research-oriented companies in the dairy industry, such as Bel. Industries, BSN - Gervais-Danone, Entremont, and also in the field of starch transformation. Roquette Freres is a world leader in sorbitol production. Orsan, Eurolysin,

and Rhome-Poulence produce aminoacids for animal feed. In genetic engineering, Transgene works in close cooperation with the University of Strasbourg.

According to a report by the Organization of Technical and Scientific Associations, eight Italian industrial firms are active in this field: Farmitalia-Carlo (Montedison group), Assoreni - this concern conducts research for the companies of the ENI-group - Lepetit, the Cesare Serone-Institut, Sorin Biomedia (Fiat group), SPA - a company which produces antibiotics, Recordati, and Salvao. According to the report, Italy lacks neither the companies nor the research capabilities for carrying out key programs in the field of biotechnology; however, the report raises the criticism that practical applications need to be better coordinated.

Europe's Largest Producer of Penicillin

Due to industrial concerns and university departments, the Netherlands is very much involved in the field of biotechnology and has a loose, but well organized structure for national coordination. The Netherlands has an excellent tradition in the fields of microbiology, biochemistry, and process technology and is among the international leaders in waste treatment.

Gist-Brocades is Europe's largest producer of penicillin with related expertise in fermentation technology; it is also one of the world's largest producer of enzymes. Similar research is going on at the Universities of Delft and Wageningen. In the food industry, the Dutch breweries and dairy plants are technically advanced and able to compete internationally. The Universities of Amsterdam (microbe physiology), Leiden (genetics), Groningen (protein crystallography and molecular dynamics), Wageningen and Delft are of particular importance in the field of biotechnology.

In Denmark, where the economy is based on agriculture, the food and chemical industries, biotechnology also plays an important role. The Carlsberg Brewery financed the establishment of an international research center with special expertise in the field of plant and cellular biology. The Novo company worked in biotechnology even before the term had been invented; today, it is the world's largest producer of industrial enzymes.

Belgium, too, has a large chemical industry and exceptional capabilities in biomedicine in its universities and research institutes. At the regional government level, Walloon, Flanders, and Brussels try to attract foreign investments in high-technology areas such as biotechnology. Hybritech, the leading American company for hybridoma technology and marketing, built a plant in Luttich. Biogen, a joint venture of the Monsanto-owned and U.S.-based Swiss group International Nickel, Schering-Plough, and Grand Metropolitan Hotels, formed a subsidiary in Ghent (Biogent). At the national level, a research association coordinates biotechnology projects.

Ireland is also trying very hard to attract foreign investments. Innovative firms include Biocon (enzymes) and various agricultural cooperatives, e.g. Kerry Farmers.

Greece, too, is making a great effort to promote biotechnology and bioscience research at universities and institutes. A national organization, Bio-Hellas, is designed to work closely with the research centers.

United States is Leading

In countries outside the European Community, biotechnology has also high priority. The large Swiss pharmaceutical companies such as Roche, Ciba-Geigy, and Sandoz are engaged in the field of new molecular technology and immunology. Biogen, headquartered in Geneva, is one of the leading new companies in interferon and vaccine synthesis and in the production of diagnostic reagents. The Technical University in Zurich is a center for fermentation research.

Scandinavia, too, has leading centers. The University of Uppsala, for instance, has close ties to Swedish pharmaceutical groups such as Fortia, Pharmacia, and Kabi-Vitrum. Finland has biotechnology know-how ranging from alcoholic beverages to the processing of chlorinated waste liquids in the paper industry.

A look beyond the borders of Europe clearly shows that the United States is the frontrunner in biotechnology. Since 1984, numerous venture capital firms have sprung up. Substantial investments in plants and research contracts created a booming and rapidly expanding industry. The leading companies from the early days such as Genetech, Cetus, and Hybritech are now listed with a capital value of several 100 million dollars.

Japan, which obviously lags behind Europe and the United States in this area, started various national programs. In the biomass program, for instance, 22 companies cooperate in five areas: production of ethanol from cellulose, production of ethanol from starch using stable enzymes, gasification of waste to produce wood cellulose materials, plant breeding to produce biofuels, and breeding of algae for fuel production. Fourteen companies from the pharmaceutical, chemical, and food industries participate in the biotechnology program. In addition, Japanese companies seek cooperation with leading companies in other countries.

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MICROELECTRONICS

PHILIPS LAB X-RAY ANALYSIS OF GALLIUM ARSENIDE CRYSTALS

Wuerzburg ELEKTRONIKPRAXIS in German Nov/Dec 84 pp 58, 60

[Text] Only very small and monochromatic X-ray beams are necessary for an X-ray analysis of gallium arsenide single crystals, the parent material of laser diodes.

The X-ray beams can be produced by reflecting X-rays on germanium single crystals four times.

At the Philips research lab at Eindhoven, the Netherlands, a measuring device is measuring with very great precision, by way of X-ray diffraction, small fluctuations in the periodicity of single crystals. In that process, the effect of doping on gallium arsenide crystals is to be examined, for instance.

Deviation of only .001°

In diffracting X-rays on such perfect crystals as those that can be produced with silicon or gallium arsenide, sharp intensity peaks occur with a half-width of only two arc seconds. Small deviations from the uniformity of the crystals cause these peaks to shift.

To perform such measurements, X-ray beams are needed with a deviation from parallelism of less than .001° and with a very low line width. The line width is 10 times smaller than that of typical radiation of gaseous chemical elements. At the same time, the intensity of the beams must be high enough to permit measurement within a reasonable time period.

Resolution of 10^{-6} nm

X-rays of this quality can be produced by reflecting the beams emerging from an X-ray diffraction tube four times on the crystal surfaces of two single crystal blocks. The precision that is necessary for the final processing of the germanium blocks is less great than can be assumed on the basis of the above-mentioned conditions, since the reflections on atomic planes occur inside the material and not on the visible surfaces. W. J. Bartels, staff member of the Eindhoven research lab, has used the equipment to measure changes in the periodicity of a single crystal with a 10^{-6} nm precision. That equals about a 100,000th of an atomic diameter.

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CSO: 3698/219

MICROELECTRONICS

NEW FACILITIES FOR SIEMENS-PHILIPS 'MEGAPROJECT'

Leinfelden-Echterdingen EEE in German 6 Nov 84 p 28

[Text] Laying the foundation stone for a microelectronic production facility meant the start of a new phase of the ambitious Siemens "megaproject" and of the colorful 25-year-old history of its Regensburg components plant.

"Mega" ("Everything goes better with energy") stands for an ambitious goal and a--for Siemens-unusual path. The objective is to manufacture, by 1987, dynamic RAMs with 1 million bits and, by 1989, DRAMs with a capacity of 4 million bits and to bring them on the market at least at the same time as their U.S. and Japanese competitors.

Siemens is planning to invest within the next few years DM 1.4 billion in microelectronics. Of that amount, DM 330 million are slated for the production facilities in Regensburg.

However, even such enormous expenditures are insufficient today in the microelectronics industry to accomplish everything. Already some time ago, Siemens and Philips agreed on a joint venture that would permit them to concentrate on subsectors of the "virulent world market in memories" (Dr Franz): Siemens is developing the DRAMS, Philips static memories (SRAMs).

According to recent press reports, the Dutch government is willing to give its blessing and a 200 million guilder subsidy. Siemens as well has applied to the respective authorities for assistance: No response has as yet been received, Dr Franz says.

The construction project in Regensburg is scheduled for completion as early as next September, and the first 256 Kbit memory will leave the factory in 1986.

The technology comes from the--in Siemens circles highly acclaimed--plant at Villach, Austria, which manufactures 64 Kbit memories in quantity and where production of the 256 Kbit type of memory will begin early next year.

The four new buildings cover a combined area of about 12,000 m^2, of which no less than 3,800 m^2 under clean room working conditions. The project will provide about 300 jobs, one-third of them for engineers and technicians. In Muenchen-Perlach, some 250 new Mega-workers are expected.

This then is good news for the now 25-year-old components plant on the grounds of a former airport in West Regensburg which, from time to time, had been the victim of heavy gusts of wind.

In peak periods, 4,000 people worked there; today, there are about 2,000, who produce shipments valued at between DM 220-250 million. The range of products includes floppy disks, foil-capacitors, anti-interference components (resistors, capacitors, chokes, filters), discrete semiconductors, opto-semiconductors and LWL system components.

"Again and again, we have brought high technology to Regensburg," Dr Franz said in his speech. He recalled that, in past years, throngs of people had visited the--at that time--ultra-modern germanium transistor production facilities in Regensburg. In his view, the name of the Upper Palatinate metropolis will again come to be synonymous with the most modern production techniques in the semiconductor area.

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MICROELECTRONICS

EC GIVES 450 MILLION GUILDERS TO ESPRIT

Rotterdam NRC HANDELSBLAD in Dutch 25 Jan 85 p 14

/Article by correspondent Wynold Verwey: "EC Gives 450 Million Guilders to start ESPRIT"/

/Excerpts/ Brussels 25 Jan--The European Commission approved last year 104 projects in the framework of research in data technology. An amount of 900 million guilders is involved in these projects; half of which is covered by the EC. The Commission announced that yesterday.

The projects in the field of data technology are carried out in the so-called ESPRIT /European Strategic Program for Research and Development in Data Technology/ program. The EC Council of Ministers approved almost a year ago a five-year program amounting to 750 million ecu /European currency unit/ (1,875 billion guilders). The goal of ESPRIT is that at least two businesses from different EC countries undertake a research project. The EC pays one half, the businesses involved pay the other half. Therefore ESPRIT amounts to a total of 1.5 million ecu (3.75 billion guilders).

Subsidiary companies of the American corporations ITT, AT & T, IBM and Digital Equipment Corporation are participating in the 104 projects which the European Commission now has approved. Sources at the Commission estimate that about 1 to 2 percent of the amount involved in the project will wind up in the American subsidiary companies.

ESPRIT's first effort appears to be a success. Last year 441 research projects were submitted, four times the amount available for that year. Of those, 104 projects survive. An average of five businesses, foundations and universities from various countries collaborate on each project.

Philips is involved in 12 projects, Oce in 3 and CWI /expansion unknown/ Amsterdam in 4 projects. Among the universities, the

University of Amsterdam is participating in two projects and the Catholic University in Nijmegen and the Twente Advanced Technical School are taking part in three each. In addition, other Dutch participants are Utrecht University, Silver-Lisco, BSO /expansion unknown/, Courseware Europe, Memonica, TNO - /Netherlands Central Organization of Applied Natural Scientific Research/ and the Dr Neher Laboratory of PTT /Post, Telegraph and Telephone/

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MICROELECTRONICS

BRIEFS

SGS-ATES, ERICSSON CHIP AGREEMENT--Milan--SGS-ATES, a firm in the public group IRI-STET [Industrial Reconstruction Institute-Telephone Finance Corporation], active in the micro-electronics sector, is going to supply integrated circuits to the Swedish Ericsson group, according to a report in the daily economic newspaper IL SOLE 24 ORE of November 2. The agreement entered into at the Stockholm based headquarters of Ericsson also foresees a joint development of integrated circuits made to specification. SGS-ATES was chosen after six attempts to enter into an agreement with other European groups handling semi-conductors, declared Stig Larsson, President of the data processing branch of Ericsson. For his part, Pasquale Pistorio, the administrator of SGS-ATES, has confirmed that the research teams of SGS will collaborate with RIFA, Ericssons firm, for developing bipolar integrated circuits so as to produce new systems of electronic telecommunications. "The two firms," he said, "will try to design components which will best serve specific needs of European industry, something that American and Japanese producers of micro-electronics cannot do." [Text] [Paris AFP SCIENCES in French 8 Nov 84 p 71] 12687

LETI SEEKS PARTNERS--The Electronics and Data-Processing Technology Laboratory stated it was ready to cooperate with European companies on basic technologies involving materials, components or instruments and systems, in the same manner as it is now collaborating with French companies such as MHS [MATRA-Harris Semiconductors]or Thomson Semiconductors. The Laboratory is especially interested in cooperating with German companies, and it organized a press conference at the Electronica Show to make this known and show what it is doing. [Text] [Paris ELECTRONIQUE ACTUALITES in French 23 Nov 84 p 25] 9294

SIEMENS INVESTMENT IN MEGAPROJECT--At Siemens the development of a dynamic RAM /Random Access Memory/ is even going further. As the next step, the firm has already begun a megabit memory (1 megabit). Such memories are regarded as "technology motors" and the main conversion processors of present and future semiconductor technology. There will be invested in Regensburg by 1987 about 7 billion Belgian francs for producing the first megabit memories. About 9 billion Belgian francs were spent for the development center in Munich-Perlach. The total investment for the "Megaproject" will amount to about 29 billion Belgian francs by the end of this decade. /Excerpts/ /Brussels DE STANDAARD in Dutch 9 Jan 85 p 12/ 8490

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SCIENTIFIC AND INDUSTRIAL POLICY

FRG TO COOPERATE WITH U.S. IN SPACE POLICY IN VIEW OF SDI

DW191307 Frankfurt/Main FRANKFURTER ALLGEMEINE in German 19 Feb 85 p 1

/Robert Held editorial: "Aspects of a German Decision"/

[Text] During the Munich military science meeting, the chancellor made it clear that the Federal Republic intends to participate in the development of the U.S. antimissile defense. Even before everything has been discussed to the end, the signal flag has already been hoisted -- the Federal Republic, which for good reasons is usually careful to maintain a "low profile," has announced its intention to collaborate in future space policies.

What President Reagan plans to implement under the title "strategic defense initiative" (SDI) seems to have a chance of being realized. Once the Americans have gotten this decision past democratic obstacles, they will not allow the Europeans to prevent them from going through with it. This is the premise of all other considerations. As to the matter itself, it will be important above all to find in the multitude of competing proposals a system which, if possible, will spot the aggressor's missile with sensor devices already in the first few minutes after lift-off and destroy them with rays or dispersion shots. Old Edward Teller thinks it will take decades to get to that point -- at least 2 decades. But by the will of not only Reagan but also of the most important segments of his nation this future has already begun. The Federal Republic raises its hand and says: If there is no other choice, count us in.

It nearly is a leap forward for the sake of escape: an escape, to begin with, from the realization that the ratio of a peace-saving strategic balance, mutually assured total destruction, cannot be kept up forever because of the barbarian character of its logic.

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SCIENTIFIC AND INDUSTRIAL POLICY

FRENCH NATIONAL ASSEMBLY DISCUSSES 85 R&D BUDGET, STRUCTURE

Budget Issues Debated

Paris AFP SCIENCES in French 8 Nov 84 pp 1-9

[Text] Paris--The debate of 5 November in the National Assembly on the research budget can be characterized as follows: A minister, Mr Hubert Curien, at his zenith, a top-priority budget from the standpoint of government policy, but flies in the ointment that were pounced upon by both the opposition and the majority.

A minister at his zenith whom the Communists, who abstained in the voting on the budget, did not attack personally, and toward whom the opposition, which voted against the budget, was laudatory, not without ulterior motive, inducing him to retort, "Do not expect me to dissociate myself from a Government with which I very obviously agree."

Although Mr Claude Birraux, UDF [French Democratic Union] deputy from Haute Savoie, addressed a cutting remark to Mr Curien: "Are you not the moral bondsman of a government adrift?", Mr Robert Galley, former minister of research, who knew Mr Curien in his functions as president of the CNRS [National Center for Scientific Research] and as general representative to the Ministry of Research and president of the CNES [National Center for Space Studies], made it a point, at the outset of his remarks during the debate, to "salute" the minister on his appointment to that office and to emphasize that: "My criticisms will be addressed less to yourself, who are not responsible for the guidelines that were laid down before your arrival, than to the organization of which you are the custodian."

"Many are those who have applauded your appointment. Put an end to the chaos of figures and structures, put an end to the double talk, rethink the entire system with the austerity for which you are known to us. When you have done that, we will be able to approve of you and follow you," said Mr Galley.

That having been said, and concretely speaking, the Civil Research and Development Budget [CRDB] will come to 40 billion francs, and if one adds to it the Military R&D Budget [MRDB] (over 20 billion francs) and the

outlay for R&D by private and nationalized enterprises, the sum total to be devoted to R&D by the nation as a whole will come to over 100 billion francs (possibly over 110 billion francs, said Mr Curien), or 2.3 percent of the GDP [Gross Domestic Product]. (See also AFP SCIENCES No. 422 of 20 September 1984, pp 8-16).

Table 1 shows the 1984-1985 evolution of budgetary credits for research that are not included in the CRDB.

The salient points in the National Assembly debate were the following:

"Adjustments" and rescissions of credits during the year: This practice which has tended to become commonplace since 1982 was particularly denounced. In Mr Galley's view, it renders debate in the Assembly "artificial," since the figures presented will not correspond to the reality. As seen by Mr Vincent Porelli, PCF [French Communist Party] deputy from Bouches du Rhone, this method of rescission of credits, "which has been repetitive since 1982, is particularly serious in regard to research, not only because it limits the credits intended for an operation clearly defined as being of high priority, but above all because of its destabilizing effect on scientific projects."

"...These lump-sum reductions (in 1984), made without any real concertation with the Ministry concerned, destroy the efforts being made to mobilize scientists around meticulously drawn up projects," stated, for his part, Mr Jean Pierre Sueur, Socialist, rapporteur for the views of the Cultural Affairs Committee. And he added, "It suffices that an entity like ANVAR [National Agency for Implementation of Research] have all its credits in the form of program authorizations for it to be harder hit than other entities whose credits are distributed among operating expenses and procurement costs."

"It is therefore absolutely necessary to not renew this operation on research credits for 1985 and succeeding years. Any other supposition can only destroy the vital structure of our research effort, the more so since for the last 2 years the appropriations bills have already taken austerity requirements into account," he added.

Mr Curien said he "regretted" the rescissions of credits "above all because of the fits and starts they impart to programs," but--he asserted-- "They have not changed the rate of growth of the really available credits, which has been, both before and after (these rescissions) 9.4 percent on average."

While the deputies did not formally condemn recourse to loans to partially get around the difficulties of budgetary adjustments, it nevertheless bothers them.

In 1985, recourse to a loan of 300 million francs is planned for the two aeronautical programs FALCON 900 and A 320. "The use of extra-budgetary financing for public-sector research thus does not appear to be an entirely

Table 1

Research Appropriations Budgeted in Other Than CRDB
(in Billions of Francs)

Source	1984	1985	1985/1984
Military research, development and testing (Program Authorizations)	19.84	20.10	1.31
Telecommunications (Program Authorizations)	2.48	2.615	5.44
University research (investment and operational)	6.47	6.75	4.32
Total	28.79	29.46	2.32

Table 2

Growth of Industry Spending on R&D

In Terms Of	1980	1981	1982	1983
Volumetric growth	5.0	6.9	4.7	0.8
Percentage of GDP	1.11	1.18	1.21	1.21

temporary expedient, but seems rather to be a new direction," argued Mr Jean-Pierre Sueur who, while recognizing that "It is entirely conceivable that programs whose ultimate aim is industrial, and which are thus potential sources of profit, can be financed totally or in part by banks, as is done in certain countries." He has serious doubts, however, regarding "the compatibility between prudent banking criteria and the very high risk factor inherent in research expenditures. Stringent profitability criteria must not be allowed to paralyze or deflect choices in the sphere of research.

"In that case, however, the banks will refuse to really accept their share of the risk, and not only will this subject the choices to being influenced by considerations extraneous to research, but, in case of failure, the state will be having to pay twice.

"Public research entities are, of course, empowered to borrow from banks. But if this form of financing is to grow in the future, the resources from which repayment will be made should be specified as being either their budgetary appropriations or their operating expenses. It also appears indispensable that borders be delimited within these entities between research with sufficient profit potential to support recourse to borrowing, and research not meeting this criterion. In short, the sphere of technical research should be reviewed in its entirety if this approach to financing is to be allowed to grow.

"Your rapporteur presses the question he raised in his budgetary questionnaire and which has not yet been answered, as regards the sectors that could be involved in recourse to the banking system and as regards the guarantees that should surround such recourse to borrowing for the financing of public research."

R&D in the Enterprises...

The outlay of the enterprises for research is still insufficient. Mr Jean-Pierre Sueur dwelt on this issue at great length.

Share of the Enterprises in Research

The growth rate of internal spending by industry on R&D is shown in Table 2.

The R&D Orientation Law called for the financing of R&D activities by the enterprises to grow at an average rate of at least 8 percent annually in terms of volume, over the period 1982-1985, with a rate of 10 percent for state-owned enterprises and 6 percent for private enterprises. In reality, the share of the total overall outlay for R&D financed by the enterprises is estimated to have grown by around 4 percent from 1982 to 1984. The state-owned enterprises in particular contributed to that rate: +9 percent on average for 1982 and 1983. Private enterprises deployed a more moderate effort: +2 percent for the same period.

These results are below objectives, which certainly could not be attained in an unfavorable situation. But they have been consistently above the GDP growth rate (+1.4 percent) and must be compared with the evolution of industrial investment, which dropped from 5.4 percent in 1982 to 3 percent in 1983. They attest to a significant effort and underscore the awareness being shown by the heads of enterprises as to the importance of the research effort. They are also the result of the various aid measures instituted by the state in support of research conducted by the enterprises.

It has become indispensable, however, that French enterprises raise their research effort to the level of their foreign competitors. The policy of restructuring the French economy, which has been implemented over the past 2 years, has restored the profit margin of the enterprises and should permit them to commit themselves, from here on out, to a vigorous research effort commensurate with that of world competition.

Although the relative share contributed by the enterprises to the financing of research spending increased by 1 percentage point from 1981 to 1983, it is still only 43 percent in France, whereas, between 1981 and 1983, this share increased from 56 percent to 60 percent in the FRG and from 62 percent to 65 percent in Japan. Even though, in making this comparison, one must consider the substantial public financing of French military research, the trend is clear.

Moreover, French enterprises are devoting to research a human potential of much lesser magnitude than their foreign competitors. In fact, the number of researchers is 14 times greater in American industry, 5-and-1/2 times greater in Japan, and twice as large in the UK and the FRG.

In addition, the French research effort is, to a far greater extent, concentrated within a small number of enterprises and branches. It is striking to note, for example, that our food-farming industries invest only 0.1 percent of their annual revenue in research, whereas the development of biotechnologies is one of the engines of the third industrial revolution.

These shortcomings stem in part from the difficulty the PME's [Small- and Medium-Sized Enterprise(s)] are still experiencing in actively committing themselves to research and development. The measures instituted by the public authorities to foment industrial research, particularly among the PMI's (increased ANVAR funding; augmented Research and Technology Fund subsidies; tax credits; industrialization, commercialization and technology transfer policy), should help attain the goal of doubling the number of enterprises contributing to the national R&D effort, set by the Second Planning Law. This goal has been set at 2,800 by 1988. All-out efforts should be devoted to its attainment, inasmuch as this figure already represents a lowering of our sights by comparison with the R&D Orientation Law, which had placed the bar very high: Between 4,000 and 5,000 enterprises by 1985 versus 1,300 in 1980.

Table 3

Financing Structure of R&D Expenditures in Industry
(in Percentages)

Source	1966	1972	1975	1978	1979	1980	1981	1982	1983*
Industry	54	62	64	68	71	70	68	71	73
Public funding	40	33	28	24	22	24	25	24	22
Other(1)	6	5	8	8	7	6	7	5	5

(*) Preliminary data.

(1) This item is comprised principally of funds from foreign-enterprise and international-organization sources (including the ESA [European Space Agency]).

However, good marks were accorded by Socialist Deputy Michel Charzat, special rapporteur of the Committee on Finance, the General Economy and the Plan, to the state-owned enterprises, whose "weight is preponderant in industrial research."

In 1982--he stated--they accounted for:

--58 percent of the spending on research; and

--54 percent of the jobs.

And they financed 28 percent of their expenditures via state-provided funds (down 1.4 percent from 1981), versus 11 percent for the private enterprises.

This high concentration of public funding of R&D in the state-owned enterprises is of course in keeping with the magnitude of their entrenchment in high-technology activities, in which they provide a large share, and in some cases the main body, of the production. Thus, they carry out 90 percent of the R&D work done in the aeronautical branch, 77 percent of that done in the energy branch, 66 percent in electronics, 61 percent in the manufacture of data processing equipment and 59 percent in chemistry.

In 1982, the state-owned enterprises increased their volume of research work by 6.7 percent (the Planning Law goal was 10 percent), and this despite the slight reduction in their share of public financing, whereas the same ratios for the private enterprises come to a 2.1-percent increase in internal research expenditures and an increase of 20 percent in state-provided funding.

The number of researchers also rose at a faster rate in the state-owned enterprises (+9.8 percent) than in the private enterprises (+2.7 percent).

Thus, the public sector substantially increased its contribution to the research effort in industry. In view of the position occupied by the public entities and the universities in the national R&D system, the state is able to influence directly the orientation and volume of research work to the extent of 80 percent of the national effort in this domain.

As regards planned-growth contracts, 11 state-owned enterprises (CGE [General Electric Company], Saint-Gobain, Thomson, Rhone-Poulenc, Pechiney, Renault, Bull, Usinor, Sacilor, EMC [Mining and Chemical Enterprise] and CDF-Chimie [French Coal Board-Chemicals]) signed such agreements involving, for all except Thomson, Pechiney and CDF-Chimie, a commitment to increase their R&D expenditures by stipulated amounts.

On average, the growth in volume of self-financed expenditures called for under these contracts was around 5 percent from 1982 to 1983, with planned spending for 1983 approaching 13 billion francs. Actual results tended to

be somewhat less. Financial difficulties, in fact, compelled certain enterprises to limit their research effort, and the updating of 1983 operating results gives rise to some concerns regarding the future.

Mr Curien made it a point to emphasize that industrial research is one of his principal concerns and that he is contemplating new ways of financing research in the enterprises (see full text of minister's speech further herein [related article hereunder]).

Problem of Credit Transfers...

The problem, and rather the practice of transferring credits, particularly from PTT to the CNES to finance R&D programs, or from the MRT [Ministry of Research and Technology] to finance the electronics and data processing sector, etc... causes concern. In the view of Mr Galley, former minister of PTT, "Today, the telephone subscriber is being made to finance the space and data processing research budgets." On the other hand--he asked, astonished-- "What is the capital grant made to CII-Honeywell Bull doing in the research budget?"

Mr Sueur asked: "What is the distribution of responsibilities among the Ministry of Research, that of Industrial Redeployment, and that of PTT?" He also said that the electronics program risks suffering from "manipulation," emphasizing that "a little clarity would be welcome..." "I must say, responded Mr Curien, "that I fail to understand the fears thus being expressed. How, in effect, can any question be raised as to the vital interest PTT is bound to have in the development of data processing, electronics and space technologies?"

La Villette...

The La Villette Museum, referred to by Mr Curien as the "Sciences and Techniques Complex," gave rise to several questions by the deputies relative to its financing and the new jobs to be created by it (510 of the 1,518 total projected by the MRT budget).

"The budgetary continuity from which the La Villette Museum has benefited," observed Mr Sueur, "would seem totally debatable. It, together with the capital grant to CII-Honeywell Bull, is the only operation not having undergone budgetary adjustments in 1982, 1983 and 1984." These two operations do not really qualify as research expenditures, even though they have been included in the CRDB. It is significant, in this respect, that the grants to the La Villette Museum must be deducted from the total budget for the purpose of making international comparisons, since these activities are not considered to be related to research and development according to international statistical definitions.

This operation undoubtedly partakes of a nature comparable to that of a research mission, since it can contribute to the dissemination of research,

Table 4

General Expenses Plus Program Authorizations
(in Billions of Francs)

Item	1984	1985	1985/1984
Pump-priming programs	8.85	9.80	+10.7
Basic research	8.22	9.0	+ 9.5
Applied and end-use research	4.65	5.10	+ 9.67
Technological development programs	8.42	8.50	+ 0.95
Tax credit	0.75	0.4	-46.67
Museum of Sciences and Techniques (La Villette)	1.84	1.42	-22.83
	32.73	34.22	+ 4.55
Undistributed general funds	4.85	5.39	+11.13
Total civil R&D budget	37.58	39.61	+ 5.40

which the 1982 law elevated to the rank of a fundamental mission. One can nevertheless question the priority it continues to enjoy in the 1985 budget appropriations bill, even though it is budgeted in a different form than heretofore [Table 4].

Program authorizations are being reduced by one-third--from 1.7 to 1.2 billion francs--owing to completion of construction of the museum. On the other hand, operating expenses rise by 120 million francs to a total of 298 million, with 175 million francs allocated to the "pre-operation" of the museum. This latter sum is to permit the creation of 510 jobs in 1985. However, except for the putting into operation of the "geode" in 1985, the opening of a part of the museum is not scheduled until 1986.

In the present context of budgetary austerity, it seems premature to create 510 jobs for this museum in 1985, considering that it is not scheduled to be opened until March 1986, that a portion of the public premises will not be available until some time between 1986 and 1988, and that the museum already has a staff of 150 persons.

Perhaps it would be opportune to contemplate a better distribution, transferring a part of the appropriation being budgeted as shared expenses to the Ministry of Research, for the purpose of increasing the number of new research jobs to be created, presently set at 600 net new jobs, thus reinforcing the priority being accorded to the research effort under the 1985 appropriations bill.

"I will personally see to it," said Mr Curien, "that recruitment is echeloned throughout the operating year, in strict lockstep with needs."

Speech by Curien

Paris AFP SCIENCES in French 8 Nov 84 pp 9-27

[Text] This text is not the full report published in the Official Bulletin of 6 November.

I am very pleased to defend before you the credits of a Ministry that has had conferred on it in 1985 both budgetary autonomy and a decided budgetary priority.

This priority is operative, of course, over the Civil Research and Development Budget [CRDB] in its entirety, for which I have interministerial responsibility, and many of you have been good enough to emphasize this responsibility, pointing out that the CRDB is growing twice as fast as the National Civil Budget exclusive of the public debt.

The CRDB [Tables "A," "B," "C"] will total 39,615 MF [million francs] in program authorizations and general expenses, 24,715 MF of which are to be provided by the MRT [Ministry of Research and Technology] budget and that

of shared services, 7,156 MF are distributed among the other budgets under the general budget, and 6,990 MF are to be provided under the PTT Supplemental Budget.

The 40 billion francs of the CRDB are themselves but one of the components of our national expenditure on research, which will very likely total 95 billion francs in 1984, or 2.22 percent of our GDP [Gross Domestic Product], and could exceed 110 billion francs in 1985, or 2.3 percent of our GDP. I have no hesitancy in saying that the 15 July 1982 Orientation and Programming Law has been a formidable engine the tangible results of which are measurable.

I am told that the budgetary credits have not increased at the 17,8-percent annual rate called for in the 1982 law. That is true, but since the GDP growth rate itself has attained only 40 percent of the presumed 3.3 percent underlying the law, the budgetary credits growth rate could have been limited to 7 percent; however, the actual rate of increase in volume of the CRDB for the period of 1981-1985 has been 10 percent.

And the credit rescissions, which I join you in regretting, above all because of the fits and starts they impart to the planned programs, have not changed the growth rate, which for the actually available credits has remained, both before and after the rescisions, 9.4 percent on average.

Without wishing to prejudge the analysis of the progress being made, that is to be conducted under the terms of the Orientation and Programming Law, I have a hunch that France's advance from its 1980 rate of 1.8 percent of our GDP to the 2.5-percent rate has been slowed by the level of research within the enterprises. I shall come back to this. The policy I intend to implement during the coming year will rest on three main pillars:

--First and foremost, personnel, with the definition of a long-term scientific jobs policy;

--Secondly, the development of industrial research and the research effort within the enterprises;

--And lastly, ongoing dedication to keeping alive the spirit of the 1982 dialogue, which provided, as Mr Porelli pointed out, a formidable opportunity to define collectively a science and technology strategy.

The 1985 appropriations bill translates into realities the bases of a scientific jobs policy; these bases were laid down by the 1982 Orientation Law over two supporting pillars:

--The first pillar is the adoption of a new set of regulations for scientific personnel, providing for a real upgrading of their situation, especially that of the engineers, technicians and administrative personnel, and, let me emphasize, for enhanced mobility. The working out of the outline statute and of the individual regulations applicable to each of the public scientific and technical enterprises was the occasion of a profound meeting of the minds

with our business-world partners, which was most gratifying to me. The proceedings were somewhat lengthy, to be sure--I agree with you, Mr Sueur--but my people are now moving at double quick time to get out most of the individual decrees, and particularly those pertaining to the CNRS [National Center for Scientific Research], the INSERM [National Institute of Health and Medical Research], and the INRA [National Institute of Agronomical Research] before the end of the year.

The interests of the personnel are completely safeguarded, since in this case the implementation of the new decrees is to take effect as of 1 January 1984. The 1985 budget takes into account the total financing of this operation.

--The second pillar of the scientific jobs policy will consist of maintaining an adequate rate of recruitment to ensure the necessary renewal of personnel and the painless integration of the new generations of researchers attracted by the policy of research bonuses which I intend to pursue and enlarge. The 1985 budget is notable in this regard, in that it provides for the creation of 1,000 jobs, 600 of which will benefit principally researchers, and over 400 of which will enable the integration of contract personnel, concerning mainly the ITA's [engineers, technicians and administrative staff]. With a 3-percent job-creation rate for researchers, recruitment can attain a level of over 5 percent, taking departures into account.

As regards the ITA's, I deliberately chose to not scatter the effect of the jobs to be created in 1985 and to concentrate them among the researchers. This does not mean that I consider the ITA's to be sufficient in number, but rather that it appears to me that priority should be given to recognizing their qualifications. This is the aim of the statutory reform and of the 418 job transformations that will make possible over 800 promotions. I am now considering ways and means of undertaking a second phase in the permanent upgrading of qualifications.

In fact, with the foregoing in place as a footing, we can now proceed to build upon it a 10- or 15-year scientific jobs policy that will integrate all dimensions of the problem. My intent is to achieve a more balanced age-pyramid, whether it be in the public research entities, the universities and schools, or the enterprises.

It is important, therefore to implement a long-term plan involving training and scholarships, recruitment, promotions and mobility, particularly in regard to the enterprises. I am particularly impressed by the very real success being encountered by the CIFRE [Industrial Contracts for Training in Research] program, specifically, with over 300 thesis-level students.

I can assure you, furthermore, that concern for the dynamism of research was at no time absent from the conception of the new regulations. The reform gives the personnel a statutory guaranty; it makes operative the instruments of an effective policy of mobility in both the public research and industrial research sectors.

First of all, it is clear that the very existence of permament-employee status is in itself a safety net for those concerned, who will thus no longer fear to venture out into external mobility. This was not the case in their more precarious situation as contract employees.

The second element is that, as a quid pro quo for the guaranties offered by the statutes, the missions assigned to the researchers have been enlarged. Specifically, their missions will obligate the researchers to develop the applicative value of the results of their research, which will undoubtedly serve as an inducement to greater mobility.

From a more technical standpoint, the basic decree governing research personnel embodies the means of promoting mobility, by providing for specific derogations to the general law governing civil service personnel that will permit, in particular, their being placed on detached-duty status and made available on a facilitated basis to private enterprises.

In addition, the basic statute provides for the possibility of their being placed on specific availability status for the creation of enterprises.

Lastly, the basic statute also provides for the mobility of personnel from one entity to another by making new positions in all the EPST's [expansion unknown] subject to competitive examinations, and by the easing of cross-overs from a given status to another.

I would add that dynamism of research will also be served by another dominant trait of the basic statute, which institutes a system of periodic evaluation of qualifications and professional activities--a more sophisticated system than the conventional administrative rating system. Mobility is one of the criteria in this evaluation.

The latter, moreover, ties in with the second mainstay of my policy, which is the development of industrial research and in particular that research done by and financed by the enterprises.

The fact is that France still has not attained a level of industrial research equal to that of its ambitions. Clearly, the absolute need of a dynamic basic research cannot be ignored and the 1985 budget does not ignore it, since it provides for a rise of 9.5 percent in appropriations. But there is also a need to foment greater penetration of research into our industrial fabric, based on two parallel types of action:

--The development of transfers of all kinds and the seeking of new modes of financing industrial research other than through the national budget;

--The dissemination of research within and in aid of the enterprises, based on cooperative structures among industrialists and researchers, which I intend to multiply. To this effect, we already have three approved

public-interest groups and 17 applications being processed for approval. This diffusion must also be based on the directions in which applicative developmental effort is channeled in research entities, on the mobility of researchers towards the enterprises, which is facilitated by the new statutes, on mixed subsidiaries, and on technological networks, or "technopolises."

I attach a very special importance to the regional level, which in my view offers the most advantageous route for local transfer to the PME's [Small- and Medium-Sized Enterprise(s)]. In addition, I will devote effort, in liaison with Mr Chevenement, to having the universities and the engineering schools fulfill to the utmost their role in this sense.

It is also essential, however, that French enterprises step up their own research effort. While the fact is that the public enterprises can be said to have fulfilled their function as prime movers, the growth of their expenditures on research having come very close to that called for by the Orientation Law, the same cannot be said of the private enterprises, although the growth of their research effort has consistently exceeded that of our GDP.

I trust that the recently observed recovery of the profit margins of the enterprises will enable them to increase their outlay. The state is aiding them in this respect, particularly through the tax-credit program, the initial results of which are entirely gratifying, since it encompasses over 1,300 enterprises, two-thirds of which have less than 500 employees. But the state cannot be expected to finance directly the needed revving up of research in the enterprises.

This is why it appears to me indispensable to seek new forms of financing, designed, for example, to attract small investors. This is a major direction in my current thinking.

But I do not intend to be alone in devoting thought to choices of this importance, and this brings me to the third strongpoint in my intended action. I intend to give the country maximum transparency and readability of the goals and results of our research policy. This is, of course, the essential object of our national policy with respect to scientific and technical culture, but it is also a necessity from the standpoint of facilitating the rapprochement of the youth of our country with the world of research. I instituted several concrete measures to this effect last month. Of course, this does not mean rehashing, each year, the 1982 dialogue, but the spirit of that dialogue cannot be allowed to wane.

A good opportunity awaits me within a few months, with the progress report on the Orientation and Programming Law that I plan to draw up, but an even better one will certainly be the preparation of the bill extending this law, which is due to expire at the end of 1985. The prime minister has

asked me to conduct the broadest possible survey of views among the researchers, the unions, the enterprises, the Higher Council of Research and Technology, the regions, the associations and the major political organizations represented in Parliament. To date, I have received positive responses from the PCF [French Communist Party] and the PS [Socialist Party], enabling us to engage in talks that I trust will be fruitful. I regret to state that the same has not been true in the case of the political organizations of the opposition.

The form to be taken by the results of these consultations and exchanges of views has not yet been decided, but it appears evident to me that you should debate on them in the last resort, so that the major orientations of our research and technological development effort are solemnly defined in full view of the country.

It seems clear to me, moreover, that this is definitely also your viewpoint, since both Mr Sueur, in his report as your rapporteur, and Mr Porelli, have voiced their comments within a post-LOP [Orientation and Programming Law] context.

And lastly, a few words concerning our pump-priming programs, 1985 appropriations for which, exclusive of Villette [La Villette Museum] will represent an increase of 5.5 percent in volume, with a very special effort devoted to the operation of laboratories: Two of these programs are being accorded high priorities in 1985, that of the electronics sector, to which I will come back shortly since it has been the object of several comments, and that of biotechnologies, which holds considerable potential for the country. "Jobs-and-working-conditions" programs and "developing-countries" programs are being given a substantial boost. The relative increase in appropriations for the "energy" program, which has attained a certain maturity, and for the "industrial fabric" program, which must be oriented towards new sources of financing, as I mentioned just a few moments ago, is somewhat less. In addition to these programs stemming from the LOP, we are deploying a sustained effort in the domain of CIM [computer-integrated manufacturing].

Before returning the floor to you, I would like to respond briefly to several more specific problems that have been brought forth. First of all, several among you have expressed concern over the action being conducted in the electronics sector and the consequences its financing through the PTT Supplemental Budget could entail.

I must say that I fail to understand the fears being expressed in this regard. How can there be any question as to the vital interest the PTT must take in the development of our data processing, electronics and space sectors? As Mr Mexandeau has told you, these are expenditures on the future of the PTT. With that as a starting point, you ask two questions: First: Who will decide? The answer to this is simple: The same authorities as heretofore.

For the sake of clarity, I think a distinction must be drawn between the PAFE [Electronics Sector Advancement Program], defined in 1982, and its research component: The pump-priming "Developmental Blueprint for the Electronics Sector" program. The overall advancement program involves, for the very vast entirety of the sector [business electronics, military electronics, telecommunications, components, consumer electronics, space , CIM, data processing, etc...), R&D supportive measures, capital grants, and the regrouping of industrial firms around bellwethers in areas of specialization. A coordinating committee--COTEFE [expansion unknown]--in which all the government departmental administrations concerned are represented, ensures the coherence of this advancement program.

Under this earmarked-appropriations program, appropriations to the electronics sector for research are made via the pump-priming "Developmental Blueprint for the Electronics Sector" program, the implementation of which from the interministerial standpoint I am responsible for ensuring under the same conditions as for the other pump-priming programs, working with credits provided under budgets other than mine. This program develops basic research and transfers know-how through national-level projects involving research entities and industrial firms. It should not be forgotten that the DGT [General Directorate of Telecommunications] is not the sole contributor to this master program for the development of the electronics sector. The CNRS, CEA [Atomic Energy Commission], university research bodies, and the Defense Ministry also contribute to it.

The second question you have raised regarding the electronics sector--and it is one that very much concerns me--is: "Is there not a risk that research will be downgraded?" Indeed, this risk is not unique to the electronics sector. It also perturbs Mr Rouquette with respect to the CEA. I can assure you that the necessary continuity between a research program and its industrial extensions is being provided, while fully maintaining an overall balance among them, in this domain as in the others.

Mr Porelli, you regret that a portion of these credits is being spent abroad. I am unable to find the source of the figure of 2 billion francs which you cite. It appears somewhat high to me. Are you thinking of the sum total of the contracts and orders to be placed by the research entities for computer hardware? In any case, the existence of a flow of orders to foreign sources hardly surprises me in a sector in which France's lag has in fact justified the adoption of a voluntarist program. I am sure you will understand that, as minister of research, I could not easily think of purely and simply halting research programs for lack of availability of high-performance hardware on the domestic market. But I fully agree with you that, to the fullest extent possible, we must be watchful.

Subsequently, you spoke with me concerning the Villette complex of sciences and techniques, expressing misgivings as to the number of recruitment authorizations accorded it by the 1985 budget.

On this point as well, I wish to be clear. In the same way that the Government undertook to not exceed the authorized credit ceiling for its construction, the concluding appropriation for which is being budgeted in 1985 (thus diminishing program authorizations by 35 percent), I shall see to it, with the same diligence, that the personnel necessary for the proper opening of the establishment in March 1986 is provided to it; the strictly necessary but all the necessary.

It makes no sense to shut down new exhibits for lack of personnel to show them.

The 510 recruitment authorizations are necessary during 1985, since a period of specific training must be provided for; but they are not all necessary as of 1 January. I shall personally see to it that recruitments are echeloned throughout the year strictly in accordance with needs, and I shall report to you on it.

Mr Charzat, you have raised a question as to the cost-effectiveness of the regional structures being put in place as of this moment, and you recommend an enhancement of the role and of the means at the disposal of the MRT's regional delegates.

I must say that I do not partake of all the questions you raise, since the diversity of regional authorities attests, on the contrary, to the very abundant number and size of local initiatives in the domain of research and technology. Furthermore, the different authorities clearly do not have the same role. Some of them are consultants and will have their role to play in the working out of extensions to the LOP.

Others are in charge of disseminating scientific and technical culture, or of disseminating innovation and technology transfers. In principle, there is no duplication of functions. On the other hand, it is important that this growth not defeat our goal of clarity, which is my constant concern. This is why I confirm the role of coordination, which must be implemented by the MRT's regional delegates. As for the operative means available to them, I am pleased to point out to you that the 1985 budget, for the first time, includes a specific line item devoted to them.

I am relying heavily on the regions to disseminate the research effort in France. I join you, Mr Tavernier, in regretting that a lustrous region such as Ile de France allocates not more than 0.15 percent of its budget to research, but my spirit is uplifted by the eight regions that dedicate more than 4 percent to it. The challenge France must meet from the two giants of research, which are the United States and Japan, lends added urgency to the need for fruitful European cooperation. The results that can be totaled up today appear to me sufficiently positive to discourage any tendency toward gloominess in this regard.

The LEP [Laboratories of Electronics and Applied Physics] chain, the only one of its kind in the world, is under construction.

With reference to the European Community, the JET [Joint European Torus] project has entered its active phase with the official inauguration of the Culham Laboratory in Great Britain. The Esprit program, relative to data processing technologies, has been adopted under French management; this is a program of major importance. Here again, I strongly hope the Community's budgetary problems will not adversely affect the research effort.

Mr Lareng, in your very positive remarks, for which I thank you, you have addressed to me a specific question on the issue of recourse to loans under the 1985 budget. The fact is that only a very small part of the civil aeronautical program will involve loans, not exceeding a total of 300 MF, together with budgetary appropriations totaling 2,287 MF, to finance the Falcon 900 and the A-320.

We have in fact estimated that the commercial outlook for these planes is sufficiently good to justify partially financing them through loan resources; and the level decided on was based on a very conservative approach, precisely to avoid having it become, in the long term, merely a deferred subsidy. Thus, for the Falcon 900, the proportion is 200 MF of appropriations by the state and 100 MF of funding through loans; and for the A-320, 640 MF of state funding plus 200 MF through loans. I am convinced that these levels are entirely reasonable.

As the president of the Republic stated to the Council of Europe in September 1982, it is important to "keep the brains of Europe in Europe, and to do this we must offer them a field that matches their capacity for research and expression."

The first meeting of the ministers of research of the 21 member countries of the Council of Europe--which took place in Paris in September pursuant to our initiative--decided to establish a network of cooperation in several domains and to institute measures to promote mobility among researchers (training on an international basis, a European system of scholarships, etc...).

I believe in the fertility of such an approach. Ladies, Honorable Deputies, distinguished Rapporteurs, Mr President: I am convinced that you share with me the certitude expressed to you on 24 July by Mr Fabius, our prime minister, when he said: "Our decision to promote research stems from a more profound conviction, a political one in the highest sense of the term, namely, our faith in the human being, in his capacity for knowledge, in the contribution this knowledge can make to progress, in the will to master peacefully the future." This faith I wish to nourish, with particular reference to the scientific community of our country, to which I render homage.

* * *

At the conclusion of the debate in the National Assembly, Mr Hubert Curien was questioned, particularly by Mr Colonna, on the issue of scientific and

technical culture, which was "evoked a little too rapidly," and on the future of the MIDIST [Interministerial Mission for Scientific and Technical Information], budgetary credits for which are diminishing...

The minister pointed out that the "development of an ambitious scientific and technical culture policy was clearly one of the Government's objectives." La Villette has a major role to play in this domain "through the multiplying of operations with our regional partners."

The minister will seek to obtain in 1986--which has not been the case for 1985--credits enabling more substantial contributions, with the help of the MIDIST, to the operation and a sound policy of regional investment aimed at implementing "a sound scientific and technical policy."

Responding also to Mr Jean-Pierre Fourre, on the subject of the project to restore the balance east of the Ile-de-France region with the development of the new city of Marne-la-Vallee, and the scientific activities plan for the Descartes complex, Mr Curien stated that the CNRS "is projecting a major set of installations at Marne-la-Vallee between 1987 and 1990. Terrain procurement operations are to start in 1985. A sum of 1.5 MF has been budgeted. Between now and the end of the year, 10 persons will be appointed to head 10 operations involving the transfer or creation of research laboratories in the following domains: Audiovisual, data processing and microelectronics, in connection with the Higher School of Data Processing and Electronics, smart-systems data processing, remote sensing and cartography, urban sociology, communication sciences, and archeology."

Regional Action on Research

As stated in his report by Mr Robert Chapuis, chairman of the Committee on Production, the regions allocated 375.5 MF to research and technology in 1984 versus 246.5 MF in 1983, an increase of 52 percent. In 1982, these expenditures had totaled 175.8 MF; in 1981: 147.7 MF; and in 1980: 74.1 MF.

However, while research is accorded a significant place in the budgets of a certain number of regions, as shown in Table "H", and while, on average, the proportion of regional credits allocated to research comes to around 3 percent, certain regions allocate to it an insignificant share of their budgets.

Thus, Mr Yves Tavernier, deputy from Essonne, was able to speak of the Ile-de-France region's "shortfall" in this domain.

Most of the regions have chosen orientations based on their natural aptitudes and potentials and have rather well conformed, in their choices, to national priorities. Under the planned-development contracts between state and region, the state will participate to the extent of 1,800 MF in the research development programs through technology transfers and the modernization of the PME's.

1985 will see the geographical decentralization of major research entities expanded. Most of these entities have already drawn up a relocation plan or have committed themselves to submitting one during 1985. This is the case specifically of the CNRS, INRA [National Institute of Agronomical Research, CNEXO [National Center for Exploitation of the Oceans], and ORSTOM [Office of Overseas Scientific and Technical Research].

In another connection, a contractual policy was developed in 1984 as between research entities and regions, through planned-development contract proceedings between state and region.

In fact, most of the entities have undertaken commitments with respect to a certain number of operations stipulated in these contracts.

Agreements have also been signed, or are in the process of being negotiated, directly between research entities and regions. These agreements will also be incorporated into the state-region planned-development contracts.

Examples in this regard are the agreements between the CNRS and the regions of Nord-Pas-de-Calais, Provence-Alpes-Cote-d'Azur, Midi-Pyrenees, and Aquitaine.

Lastly, certain research entities have set up structures for concordance and coordination with regional plans. Examples in this regard are the CNRS regional delegates and the INRA delegates.

[Tables "A" thru "H" follow]:

Table "A"
Civil Research Budget (Millions of Francs)

Item	D.O. + A.P. (1) 1984	D.O. + A.P. (1) 1984	1985/1984	D.O. + C.P. (2) 1984	D.O. + C.P. (2) 1985	1985/1984
(3) Services communs	208,0	292,7	40,72	206,8	253,8	22,72
(4) Recherche et Technologie	(*) 26.213,3	24.422,2	— 6,83	(*) 24.689,2	23.058,0	— 6,61
(5) Redéploiement industriel et Commerce extérieur	296,9	199,3	— 32,87	289,1	185,9	— 35,7
(6) P.T.T.	2.800,0	(*) 6.990,7	149,66	2.270,2	(*) 6.255,3	175,53
(7) Autres ministères	7.316,6	6.956,5	— 4,93	6.692,1	6.954,1	3,91
(8) Sous-total	36.834,8	38.861,4	5,42	34.147,4	36.707,1	7,49
(9) Crédit d'impôt	750,0	400,0	— 46,67	750,0	400,0	— 46,67
(10) Financement externe :						
(11) 1. I.R.C.H.A. (financement I.F.P.)	»	53,50	»	»	52,7	»
(12) 2. Programmes Falcon 900 et A 320 (financement par emprunt)	»	300,0	»	»	300,0	»
Total	37.584,8	39.614,90	5,40	34.897,4	37.459,6	7,34

(*) Includes CNES [National Center for Space Studies], ADI [Data Processing Agency], INRIA [National Institute for Research on Data Processing and Automation], and CESIA [expansion unknown].

Key:

1. General Expenses Plus Program Authorizations.
2. General Expenses Plus Outpayment Credits.
3. Shared Services.
4. Ministry of Research and Technology.
5. Ministry of Foreign Trade and Industrial Redeployment.
6. Ministry of PTT.
7. Other ministries.
8. Subtotal.
9. Tax Credit.
10. External financing.
11. IRCHA [National Institute of Applied Chemical Research] (French Petroleum Institute funding).
12. Falcon 900 and A-320 programs (financing through loans).

Table "B"

Civil Research Budget - General Expenses (Millions of Francs)

Item	1984	1985	1985/1984 (En pourcentage) (1)
(2) Services communs (Redéploiement industriel et Recherche)	188,4	217,3	15,34
(3) Recherche et technologie	(*) 14.837,0	15.896,1	7,14
(4) Redéploiement industriel et Commerce extérieur	143,0	99,0	— 30,77
(5) P.T.T.	»	183,8	»
(6) Autres ministères	1.717,7	2.047,2	19,18
(7) Sous-total	16.886,1	18.443,4	9,22
(8) Financement externe I.R.C.H.A. (Institut national de recherche chimique appliquée) par l'I.F.P. (Institut français du pétrole)	»	34,8	»
Total	16.886,1	18.478,2	9,42

(*) Includes credits of the ADI and INRIA.

Key:

1. In Percentages.
2. Shared services (Ministry of Foreign Trade & Industrial Redeployment).
3. Ministry of Research and Technology.
4. Ministry of Foreign Trade & Industrial Redeployment.
5. Ministry of PTT.
6. Other ministries.
7. Subtotal.
8. External financing of IRCHA by IFP.

Table "C"

Civil Research Budget - Capital Expenditures (Millions of Francs)

Item	Autorisations de programme (1) 1984	Autorisations de programme (1) 1985	1985/1984	Crédits de paiement (2) 1984	Crédits de paiement (2) 1985	1985/1984
(3)Services communs	19,6	75,4	284,69	18,4	36,5	98,37
(4)Recherche et Technologie	(*) 11.376,3	8.526,1	— 25,06	(*) 9.852,2	7.161,9	— 21,31
(5)Redéploiement industriel et Commerce extérieur	153,9	100,3	— 34,83	146,1	86,9	— 40,52
(6)P.T.T.	2.800,0	6.806,9	146,10	2.270,2	6.071,5	167,44
(7)Autres ministères	5.598,9	4.909,3	— 12,32	4.974,4	4.906,9	— 1,36
(8)Sous-total	19.948,7	20.418,0	2,35	17.261,3	18.263,7	5,80
(9)Financement externe :						
(10) 1. I.R.C.H.A. (financement I.F.P.)	»	18,7	»	»	17,9	»
(11) 2. Programmes Falcon 900 et A 320 (financement par emprunt)	»	300,0	»	»	300,0	»
Total	19.948,7	20.736,7	3,95	17.261,3	18.581,6	7,64

(*) Includes appropriations of the CNES, INRIA, CESIA and ADI.

Key:

1. Program Authorizations.
2. Outpayment Credits.
3. Shared services.
4. Ministry of Research and Technology.
5. Ministry of Foreign Trade & Industrial Redeployment.
6. Ministry of PTT.
7. Other ministries.
8. Subtotal.
9. External financing.
10. National Institute of Applied Chemical Research (IFP funding).
11. Falcon 900 and A-320 programs (financing through loans).

Table "D"

Evolution of Ministry of Research and Technology Staffing

(1) Ministère de la recherche et de la technologie	(2) Effectifs 1984			1985									(2) Effectifs 1985		
				Créations nettes (3)			Régularisations (4)			Total des créations 1985 (5)					
	Chercheurs (6) ou cadres	I.T.A. (7) ou non cadres	Total	Chercheurs (6) ou cadres	I.T.A. (7) ou non cadres	Total	Chercheurs (6) ou cadres	I.T.A. (7) ou non cadres	Total	Chercheurs (6) ou cadres	I.T.A. (7) ou non cadres	Total	Chercheurs (6) ou cadres	I.T.A. (7) ou non cadres	Total
Administration centrale (8)	—	298	298	—	—	—	—	21	21	—	21	21	—	319	319
CESTA (9)	—	—	—	—	—	—	38	31	69	38	31	69	38	31	69
CNRS et instituts (10)	9 878	15 082	24 960	298	12	310	—	6	6	298	18	316	10 176	15 100	25 276
CEA (11)	1 773	10 310	12 083	24	—	24	—	—	—	24	—	24	1 797	10 310	12 107
CNES (12)	204	1 450	1 654	39	—	39	—	—	—	39	—	39	243	1 450	1 693
INRA (13)	1 422	6 595	8 017	50	8	58	—	—	—	50	8	58	1 472	6 603	8 075
INSERM (14)	1 640	2 609	4 249	60	8	68	1	3	4	61	11	72	1 701	2 620	4 321
Institut Pasteur (15)	(22)	(30)	(52)	—	—	—	—	—	—	—	—	—	(22)	(30)	(52)
IPOM (16)	(3)	—	(3)	—	—	—	—	—	—	—	—	—	(3)	—	(3)
IFREMER (17)	272	748	1 020	12	—	12	8	25	33	20	25	45	292	773	1 065
AFME (18)	—	136	136	—	—	—	—	—	—	—	—	—	—	136	136
ORSTOM (19)	691	728	1 419	14	7	21	—	15	15	14	22	36	705	750	1 455
GERDAT (20)	514	507	1 021	13	7	20	6	8	14	19	15	34	533	522	1 055
ANVAR (21)	4	286	290	3	2	5	10	15	25	13	17	30	17	303	320
Total M.R.T. (1)	16 398	38 749	55 147	513	44	557	63	124	187	576	168	744	16 974	38 917	55 891

Key:

1. Ministry of Research & Technology [MRT].
2. Employees (year).
3. Net New Jobs.
4. Regularizations.
5. Total Creations (year).
6. Researchers, Supervisors, Middle Managers.
7. Engineers, Technicians, Administrators & Non-Management.
8. Head office administration.
9. Center for Study of Advanced Systems and Technologies.
10. CNRS [see text] and institutes.
11. Atomic Energy Commission.
12. CNES [see text].
13. INRA [see text].
14. National Institute of Health and Medical Research.
15. Pasteur Institute.
16. IPOM [expansion unknown].
17. IFREMER [expansion unknown].
18. French Agency for the Harnessing of Energy.
19. Office of Overseas Scientific & Technical Research.
20. Study & Research Group for the Development of Tropical Agronomy.
21. National Agency for Implementation of Research.

Table "E"

Evolution of Research and Technology Staffing in Other Ministries

(1) Autres Ministères	(2) Effectifs 1984			1 / 9 / 8 / 5 (3) Créations nettes			(4) Régularisations			(5) Total des créations 1985			(1) Effectifs 1985		
	Chercheurs (6) ou cadres	I.T.A. (7) ou non cadres	Total	Chercheurs (6) ou cadres	I.T.A. (7) ou non cadres	Total	Chercheurs (6) ou cadres	I.T.A. (7) ou non cadres	Total	Chercheurs (6) ou cadres	I.T.A. (7) ou non cadres	Total	Chercheurs (6) ou cadres	I.T.A. (7) ou non cadres	Total
Redéploiement industriel et commerce extérieur (8)															
Écoles des mines (9)	186	235	421	9	2	11	—	—	—	9	2	11	195	237	432
BNM (10)	2	13	15	—	—	—	—	—	—	—	—	—	2	13	15
BRGM (11)	185	193	378	—	—	—	—	—	—	—	—	—	185	193	378
Agriculture (12)															
CEMAGREF (13)	89	472	561	—	—	—	—	—	—	—	—	—	89	472	561
ACTA (14)	26	24	50	—	—	—	—	—	—	—	—	—	26	24	50
Culture (15)	155	397	552	5	—	5	—	60	60	5	60	65	160	457	617
DOM-TOM (TAAF; (16)	—	42	42	—	—	—	—	—	—	—	—	—	—	42	42
Économie et finances (17)															
Consommation (18)	1	1	2	—	—	—	—	—	—	—	—	—	1	1	2
Musée STI (19)	—	150	150	—	510	510	—	—	—	—	510	510	—	660	660
Education nationale: (20)	22	991	1 013	—	10	10	—	9	9	—	19	19	22	1 010	1 032
Environnement (21)	10	24	34	—	—	—	—	—	—	—	—	—	10	24	34
Plan et aménagement du territoire (22)	3	9	12	—	1	1	—	—	—	—	1	1	1	10	13
Affaires sociales et solidarité nationale (23)															
Mission recherche (24)	—	3	3	—	—	—	—	—	—	—	—	—	—	3	3
SCPRI (25)	—	127	127	—	—	—	—	—	—	—	—	—	—	127	127
INED (26)	50	97	147	1	—	1	—	—	—	1	—	1	51	97	148
CEE (27)	27	37	64	—	—	—	—	—	—	—	—	—	27	37	64
Urbanisme, logement et transports (28)															
Administration centrale et urbanisme (29)	15	34	49	—	2	2	—	4	4	—	6	6	15	40	55
LCPC (30)	116	260	376	—	—	—	—	—	—	—	—	—	116	260	376
CSTB (31)	120	198	318	—	—	—	—	—	—	—	—	—	120	198	318
Administration centrale et transports (32)	—	5	5	—	—	—	—	—	—	—	—	—	—	5	5
IRT (33)	97	140	237	1	1	2	50	85	135	51	86	137	148	226	374
Météorologie (34)	147	99	246	—	—	—	—	—	—	—	—	—	147	99	246
Total autres ministères (35)	1 251	3 554	4 805	16	526	542	50	158	208	66	684	750	1 317	4 238	5 555
Ministère des P.T.T. (36)															
ADI (37)	7	108	115	—	—	—	—	—	—	—	—	—	7	108	115
CESTA + IIIN (38)	—	77	77	—	—	—	—	—	—	—	—	—	—	77	77
INRIA (39)	187	289	476	7	4	11	1	13	13	7	17	24	194	306	500
Total P.T.T.	194	474	668	7	4	11	—	13	13	7	17	24	201	491	692
Total général (40)	17 043	42 777	60 620	536	574	1 110	113	345	408	649	869	1 518	18 492	43 646	62 138

[Key on following page]:

Key to Table "E" on preceding page:

1. Other Ministries.
2. Employees (year).
3. Net New Jobs.
4. Regularizations.
5. Total Creations (year).
6. Researchers, Supervisors, Middle Management.
7. Engineers, Technicians, Administrators & Non-Management.
8. Ministry of Foreign Trade and Industrial Redeployment.
9. Schools of Mining.
10. National Bureau of Metrology.
11. Bureau of Geological and Mining Research.
12. Ministry of Agriculture.
13. CEMAGREF [expansion unknown].
14. Association for Technical Agricultural Coordination.
15. Ministry of Culture.
16. Overseas Departments and Territories-French Southern and Antarctic Lands.
17. Ministry of Economy, Finance & Budget.
18. Consumer Affairs.
19. STI Museum.
20. Ministry of Education.
21. Ministry of Education.
22. Ministry of Planning and Regional Development.
23. Ministry of National Solidarity.
24. Research Mission.
25. Central Protective Service Against Ionizing Radiation.
26. National Institute of Demographic Studies.
27. European Economic Community [EEC].
28. Ministry of Urban Planning, Housing & Transportation.
29. Headquarters Administration and Transportation.
30. Main Highway Department Laboratory.
31. Scientific and Technical Center of the Building Industry.
32. Headquarters Administration and Transportation.
33. Institute for Transportation Research.
34. Meteorology.
35. Total Other Ministries.
36. Ministry of PTT.
37. Data Processing Agency.
38. Center for Study of Advanced Systems and Technologies-IHN [expansion unknown].
39. National Institute for Research on Data Processing and Automation.
40. Sum Total.

Table "F"

Structural Guidelines for Programming of Applied and End-Use Research

(in Millions of Francs)

	(1) Dépenses ordinaires		(2) AP		(3) DO + AP	
	1984	1985	1984	1985	1984	1985
A. Matières premières et transformations (4)						
(5) CEA	29,8	31,6	−4,1	−5,5	25,7	26,1
(6) AFME	—	0,2	—	2,5	—	2,7
(7) IFREMER	9,2	10,5	6,7	7,4	15,9	17,9
(8) CNRS	559,3	600,3	134,2	145,4	693,5	745,7
(9) FRT*	—	—	(119,1)	nd	(119,1)	nd
(10) BRGM	26,4	28,5	19,8	21,0	46,2	49,5
(11) Ecoles des Mines	31,8	38,8	8,3	11,9	40,1	50,7
(12) Ministère de l'Education Nationale	—	—	35,5	38,9	35,5	38,9
(13) CSTB	6,6	7,0	2,9	3,4	9,5	10,4
(14) DOM TOM - TAAF	0,1	0,1	0,3	0,3	0,4	0,4
(15) IRCHA	5,2	—	1,8	—	7,0	—
Total	668,4	717,0	205,4	225,3	873,8	942,3
B. Mécanique - productique - électronique (16)						
(5) CEA	15,3	16,7	15,7	22,2	31,0	38,9
(8) CNRS	43,3	49,2	10,8	11,0	54,1	60,2
(17) BNM	9,4	10,0	17,0	17,0	26,4	27,0
(10) BRGM	6,1	6,5	4,6	4,9	10,7	11,4
(9) FRT*	—	—	(100,0)	nd	(100,0)	nd
(18) Intérieur et Décentralisation	—	—	0,4	1,0	0,4	1,0
(12) Ministère de l'Education Nationale	—	—	18,8	20,7	18,8	20,7
(19) IGN	—	—	1,2	1,3	1,2	1,3
(20) Ministère des Relations Extérieures	—	2,2	—	—	—	2,2
(21) Navigation aérienne (Transports)	—	—	19,7	17,6	19,7	17,6
Total	74,1	84,6	88,2	95,7	162,3	180,3
C. Agronomie et ressources vivantes (22)						
(23) INRA	645,4	698,8	120,8	110,8	766,2	809,6
(5) CEA	37,7	40,0	16,0	17,7	53,7	57,7
(9) FRT*	—	—	(57,1)	nd	(57,1)	nd
(7) IFREMER	76,00	86,4	59,0	55,1	135,0	141,5
(8) CNRS	105,8	113,3	17,0	21,3	122,8	134,6
(24) CEMAGREF	31,4	35,5	12,2	14,3	43,6	49,8
(25) ACTA	6,1	6,6	6,5	6,6	12,6	13,2
(26) Filière agro-alimentaire	—	—	17,4	18,2	17,4	18,2
(12) Ministère de l'Education Nationale	—	—	4,3	4,7	4,3	4,7
(13) CSTB	0,6	0,6	0,3	0,4	0,9	1,0
(14) DOM TOM - TAAF	0,4	0,6	0,6	0,5	1,0	1,1
(27) Secrétariat d'Etat à la Mer	—	—	1,9	2,0	1,9	2,0
Total	903,4	981,8	256,0	251,6	1 159,4	1 233,4
D. Santé - conditions de Vie (28)						
(5) CEA	226,2	240,3	−107,6	−117,0	118,6	123,3
(9) FRT*	—	—	(90,5)	nd	(90,5)	nd
(8) CNRS	483,9	515,0	118,8	108,6	602,7	623,6
(29) INSERM	348,9	358,3	156,0	144,7	504,9	503,0
(30) Pasteur Paris	22,1	25,6	16,3	18,4	38,4	44,0

[Table "F" continues on next page, followed by Table "F" footnotes and key]:

Table "F" (cont'd)

Structural Guidelines for Programming of Applied and End-Use Research

(in Millions of Francs)

	Dépenses ordinaires (1)		(2) AP		(3)DO + AP	
	1984	1985	1984	1985	1984	1985
(31)Pasteur Lille	—	—	4,5	2,6	4,5	2,6
(32)ADI	1,4	1,5	8,9	7,0	10,3	8,5
(33)Affaires Sociales et Solidarité Nationale	0,6	0,6	6,0	6,2	6,6	6,8
(34)SCPRI	28,3	29,9	9,8	10,0	38,1	39,9
(35)Institut Curie	1,5	1,6	1,0	1,1	2,5	2,7
(36)INED	7,4	7,8	2,8	3,1	10,2	10,9
(37)Ministère du Plan**	0,3	0,3	1,5	3,1	1,8	0,3
(18)Intérieur et Décentralisation	—	—	—	0,2	—	0,2
(12)Ministère de l'Education Nationale	—	—	25,7	28,2	25,7	28,2
(38)Ministère de la Justice	0,7	0,7	0,8	0,8	1,5	1,5
(39)Ministère de la Consommation	0,4	0,4	—	—	0,4	0,4
Total	1 121,7	1 182,0	244,5	213,9	1 366,2	1 395,9
E. Habitat - génie civil - transports - aménagement - environnement (40)						
(9)FRT*	—	—	(57,7)	nd	(54,7)	nd
(7)IFREMER	24,4	27,7	13,4	19,1	37,8	46,8
(8)CNRS	104,3	111,1	17,1	28,0	121,4	139,1
(10)BRGM	11,9	12,6	9,1	9,6	21,0	22,2
(37)Ministère du Plan**	—	—	0,5	(3,0)	0,5	(3,0)
(41)IRSET (au 1.1.1985)	30,5	60,8	8,4	15,9	38,9	76,7
(42)EERM	19,3	19,8	12,5	8,0	31,8	27,8
(43)LCPC (Transports)	25,3	26,6	—	—	25,3	26,6
(44)FARIT et SERT	—	—	65,7	46,2	65,7	46,2
(24)CEMAGREF	17,2	18,8	4,7	9,9	21,9	28,7
(18)Intérieur et Décentralisation	—	—	2,6	3,0	2,6	3,0
(12)Ministère de l'Education Nationale	—	—	2,6	2,8	2,6	2,8
(45)LCPC (Urbanisme et Logement)	41,3	43,2	15,7	16,4	57,0	59,6
(13)CSTB	30,9	32,7	13,2	12,1	44,1	44,8
(46)Actions incitatives MUL	—	—	45,9	54,3	45,9	54,3
(47)Ministère de l'Environnement	6,5	7,4	45,8	47,5	52,3	54,9
(27)Secrétariat d'Etat à la Mer	—	—	3,6	3,7	3,6	3,7
(21)Navigation aérienne (Transports)	—	—	—	0.6	—	0,6
Total	311,6	360,7	260,8	277,1	572,4	637,8
F. Culture - éducation - organisation (48)						
(49)FRST*	—	—	(74,6)	nd	(74,6)	nd
(50)CESTA	—	2,0	—	1,0	—	3,0
(8)CNRS	36,0	37,8	1,8	1,8	37,8	39,6
(37)Ministère du Plan**	—	—	—	(3,0)	—	(3,0)
(51)IFRI	—	—	1,3	1,8	1,3	1,8
(52)Ministère de la Culture	19,5	21,2	16,5	13,4	36,0	34,6
(12)Ministère de l'Education Nationale	—	—	1,7	1,9	1,7	1,9
(32)ADI	2,8	2,9	27,0	23,3	29,8	26,2
Total	58,3	63,9	48,3	43,2	106,6	107,1
Total général	3 137,5	3 390,0	1 103,2	1 106.8	4 240,7	4 496,8

[Table "F" footnotes and key follow]:

[Footnotes to Table "F":

* Information not available owing to instituting of new management procedure pertaining to Research and Technology Fund.

** Program Authorizations opened in 1984 and prior thereto.

nd = not determined.

Key to Table "F":

1. General Expenses.
2. Program Authorizations.
3. General Expenses Plus Program Authorizations.
4. Raw Materials & Transformations.
5. Atomic Energy Commission [AEC].
6. French Agency for the Harnessing of Energy.
7. IFREMER [expansion unknown].
8. National Center for Scientific Research.
9. Research and Technology Fund.
10. Bureau of Geological & Mining Research.
11. Schools of Mining.
12. Ministry of Education.
13. Scientific and Technical Center of the Building Industry.
14. Overseas Departments and Territories-French Southern and Antarctic Lands.
15. National Institute of Applied Chemical Research.
16. Mechanics, Computer-Integrated-Manufacturing, Electronics.
17. National Bureau for Metrology.
18. Ministry of Interior and Decentralization.
19. National Geographic Institute.
20. Ministry of External Relations.
21. Air Navigation (Transportation)
22. Agronomy and Live Resources.
23. National Institute of Agronomical Research.
24. CEMAGREF [expansion unknown].
25. Association for Technical Agricultural Coordination.
26. Food Farming Sector.
27. Secretariat of State for Maritime Affairs.
28. Public Health, Quality of Life
29. National Institute of Health and Medical Research.
30. Pasteur Institute, Paris.
31. Pasteur Institute, Lille.
32. Data Processing Agency.
33. Ministry of Social Affairs and National Solidarity.
34. Central Service for Protection Against Ionizing Radiation.
35. Curie Institute.
36. National Institute of Demographic Studies.
37. Ministry of Planning & Regional Development.
38. Ministry of Justice.
39. Ministry of Consumer Affairs.
40. Housing, Urban Affairs, Transportation, Urban Planning, Environment.
41. IRSET [expansion unknown] (as of 1 January 1985).
42. National Meteorological Studies and Research Center.
43. Central Laboratory for Bridges and Roads (Transportation).
44. FARIT [expansion unknown] and SERT [expansion unknown].
45. Central Laboratory for Bridges and Roads (Urban Development and Housing).
46. Ministry of Urban Planning and Housing initiatives.
47. Ministry of Environment.
48. Culture, Education, Organization.
49. FRST [expansion unknown].
50. Center for Study of Advanced Systems and Technologies.
51. French International Relations Institute.
52. Ministry of Culture.

Table "G"

Basic Planning Structure for 1984-1985 Technological Developmental Programs - By Ministries

(in Millions of Francs)

Ministry	1984						1985					
	(1) Dépenses ordinaires	(2) Autorisations de programmes				(7) Total Do + AP	(1) Dépenses ordinaires	(2) Autorisations de programmes				(7) Total Do + AP
		(3) Soutien des programmes	(4) Actions incitatives	(5) Autres AP	(6) Total AP			(3) Soutien des programmes	(4) Actions incitatives	(5) Autres AP	(6) Total AP	
Ministère de la recherche et de la technologie (8)	2 051,0	3,5	12,0	1 402,2	1 417,7	3 468,7	2 184,7	3,6	12,1	1 471,6	1 487,3	3 672,0
CEA (9)	1 765,0	—	—	1 356,0	1 356,0	3 121,0	1 873,8	—	—	1 416,2	1 416,2	3 290,0
IFREMER (10)	23,0	3,5	12,0	46,2	61,7	84,7	26,1	3,6	12,1	55,4	71,1	97,2
CNES (11)	263,0	—	—	—	—	263,0	284,8	—	—	—	—	284,8
Ministère du redéploiement industriel et du commerce extérieur (BRGM) (12)	1,8	1,3	—	—	1,3	3,1	1,9	1,7	—	—	1,7	3,6
Ministère des PTT (CNES) (13)	—	33,6	106,0	2 223,9	2 363,5	2 363,5	—	42,2	130,0	2 353,7	2 525,9	2 525,9
Ministère des transports (14)	0,7	0,1	564,0	1 748,4	2 312,5	2 313,2	0,8	—	677,0	1 415,8	2 092,8	2 093,6
IRSET (au 1/1/1985) (15)	0,7	0,1	—	0,1	0,2	0,9	0,8	—	—	•	•	0,8
EERM (16)	—	—	—	5,3	5,3	5,3	—	—	—	5,3	5,3	5,3
Sécurité et réglementation (17)	—	—	20,0	—	20,0	20,0	—	—	20,0		20,0	20,0
Construction aéronautique (18)	—	—	544	1 743,0	2 287,0	2 287,0	—	—	657,0	1 410,5	2 067,5	2 067,5
Ministère de l'urbanisme (19) et du logement IGN	—	2,6	—	6,3	8,9	8,9	—	2,6	—	5,8	8,4	8,4
DOM-TOM-TAAF (20)	0,4	0,2	—	0,4	0,6	1,0	0,4	0,2	—	—	0,2	0,6
Secrétariat d'État à la mer (21)	—	—	22,1	—	22,1	22,1	—	—	22,4	—	22,4	22,4
Total général	2 053,9	41,3	704,1	5 381,2	6 126,6	8 180,5	2 187,8	50,3	841,5	5 246,9	6 138,7	8 326,5

Key:

1. General Expenses.
2. Program Authorizations.
3. Program Support.
4. Program Startups.
5. Other Program Authorizations.
6. Total Program Authorizations.
7. General Expenses Plus Program Authorizations.
8. Ministry of Research and Technology.
9. Atomic Energy Commission.
10. IFREMER [expansion unknown].
11. National Center for Space Research.
12. Ministry of Foreign Trade & Industrial Redeployment.
13. Ministry of PTT (CNES).
14. Ministry of Transportation.
15. IRSET [expansion unknown] (as of 1 January 1985).
16. National Meteorological Studies and Research Center.
17. Safety and Regulatory Matters.
18. Aeronautical Construction.
19. Ministry of Urban Planning and Housing (National Geographic Institute).
20. Overseas Departments & Territories - French Southern and Antarctic Lands.
21. Secretariat of State for Maritime Affairs.

Table "H"

Evolution of "Research and Technology" Budgets of the Regions

(in Millions of Francs)

	1983		1984	
	(A) Recherche et technologie	(B) Pourcentage du Budget total (1)	(A) Recherche et technologie	(B) Pourcentage du Budget total (1)
Ile-de-France	8	0,25	6,5	0,15
Provence-Côte d'Azur	30	3,41	50	4,17
Rhônes-Alpes	29	4,32	52	4,90
Bretagne	20	4,10	23,5	3,73
Midi-Pyrénées	4,5	0,78	15,5	2,71
Languedoc-Roussillon	6,9	0,53	18,5	3,50
Centre	6,5	2,14	8,5	1,87
Alsace	10	5,31	16	4,52
Aquitaine	15,8	3,50	27,2	3,71
Lorraine	10	3,65	18,5	3,81
Pays de la Loire	14,4	3,35	15,4	2,11
Auvergne	3	1,16	5,6	1,44
Bourgogne	10,8	4,13	13	3,56
Basse-Normandie	8,1	3,69	10,5	3,66
Nord-Pas de Calais	33	2,18	33	2,90
Poitou-Charente	3,6	1,05	8,3	1,80
Haute-Normandie	5,7	2,52	9,4	2,77
Picardie	5,1	1,89	12,5	2,77
Franche-Comté	7,5	2,33	9,6	3,47
Champagne-Ardenne	8,2	3,26	12,8	3,92
Limousin	4,8	4,07	8,5	4,1
Corse	1,6	1,61	0,7 (3)	0,3
D.O.M.-T.O.M. (C)	(2)		(2)	
Total	248,5	2,73	375,5	2,99

1) Investment plus operations.
2) Not available.
3) Budget drawn up by the state; budget and planned-development contract not passed by Regional Council a/o 15 August 1984.

Key:

A. Research & Technology.

B. Percentage of Total Budget.

C. Overseas Departments & Territories.

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SCIENTIFIC AND INDUSTRIAL POLICY

EEC MEMBERS RECOMMEND BETTER VENTURE CAPITAL LAWS

Leinfelden-Echterdingen EEE in German 6 Nov 84 p 2

[Text] The EEC member governments should intensively promote the financing of enterprises during the crucial growth stage by modifying the legal and fiscal conditions. As long as young entrepreneurs are not listed at the stock exchange, the state must make efforts to minimize the financial risks of entrepreneurs and investors.

This is the conclusion reached by the European Venture Capital Association (EVCA) at its fifth venture capital symposium jointly held with the EEC Commission last October in Luxembourg.

Other conclusions of the meeting, which brought together 180 experts from 18 countries, are:

- Current laws and regulations are inadequate to meet the potential of the European venture capital market;

- EEC efforts to harmonize national laws and regulations through guidelines continue to proceed very slowly, and final results are often based on priorities established years earlier;

- Differences in accounting practices and bylaws are two important obstacles to European transborder venture financing;

- In light of lower exchange rate risks, the ECU should increasingly be used EEC-wide as currency for venture business.

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SCIENTIFIC AND INDUSTRIAL POLICY

FRANCE EVALUATES FIRST 3 YEARS OF ELECTRONICS PLAN

Growth of Electronics Sector

Paris ELECTRONIQUE ACTUALITES in French 23 Nov 84 p 3

[Article: "Positive Balance at Half-Time; Reaffirmation of Priority Given to Electronics Sector"]

> [Text] Meeting last Wednesday, the Cabinet made a positive evaluation of the efforts made in the electronics sector since 1982. French production increased by 8 percent per year by volume during the last 3 years, compared with 3 percent previously, and the trade balance showed a marked recovery (the deficit--FF 15 billion in 1982--will be reduced to FF 6 billion in 1984). For the future, the government reaffirmed that priority would be given to the electronics sector, and promised "considerable state support, both as stockholders' equity and as research and development, in particular in the field of components, which lies at the core of the whole sector.

Commenting on the efforts made since the program of action for the electronics sector was launched (in July 1982), Mrs Cresson and Messrs Curien and Mexandeau, respectively ministers of industrial redeployment, of research and technology and of post and telecommunications, stated they were pleased with the positive results that became apparent in 1984. Since 1982, the rate of production of the sector has grown from 3 to 8 percent per year by volume, "which has made it possible to gain two years of production in three years," we were told by Mr Hirel, Mr Mexandeau's chief of staff. This accelerated rate has made it possible to check the previous trend that would have led to the loss of 10,000 jobs and a deficit of FF 19 billion in 1986. Note, however, that the 8-percent rate achieved is one point below the objective set in 1982 (i.e. +9 percent).

The additional effort made by the government amounted to FF 6 billion in 1982, FF 10 billion in 1983 and FF 11 billion in 1984. It will be increased to FF 12 billion in 1985. In addition, the government has made a considerable training effort, exceeding the objectives of the make-up plan started in 1982.

An analysis of the situation by sectors reveals a satisfactory development of professional electronics (+ 20 percent per year) and telecommunications (+ 10 percent), which show positive trade balances (respectively FF 10 billion and FF 3 billion in 1984). The production of components is rising by close to 30 percent per year, and the deficit was kept within the FF 2-billion limit. In the data-processing industry, recovery has started and the balance of trade is improving, while software and systems houses have seen their production rise by 50 percent between 1982 and 1984, with a positive balance of trade and the creation of 3,000 additional jobs per year. Finally, in consumer electronics, we note a reduction of the foreign trade deficit and the launching of an industrial production of video games and household microcomputers.

New Strategy Emerges

Paris ELECTRONIQUE ACTUALITES in French 30 Nov 84 pp 1, 28

[Article by P. Schaeffer: "Little by Little, the Electronics Sector is Changing its Strategy"]

> [Text] The positive balance of the electronics sector at half-time, drawn last week at a Cabinet meeting (see our last issue) deals mainly with figures. And, for the future, the government reaffirmed that priority would be given to this sector which "constitutes an essential orientation of industrial redeployment." This future, however, does not present itself exactly in the same context as three years ago, for some data have changed since then and lessons were learned when some hopes did not materialize.

As is known, the main goal was to replace the French electronics industry on a growth slope similar to that followed in other highly industrialized countries, so as not to widen the gap beyond remedy; the main goal was also to reduce the trade balance deficit of the sector. In these two respects, the unfavorable trend of 1981 was reversed, and there is every indication that the positive results already achieved should continue.

The means used to achieve these results were considerable. The government's financial commitments, in particular, were very high (although they may not bear comparison with those made in the United States and Japan, for instance) and, significantly, they will extend over a rather long period, making it easier to set up pluriannual plans.

Thus, it was possible to define an industrial policy based on synergism among various sectors. It is this synergism, in which each sector is supporting another, which is now bearing fruit (the main actors are now fully aware of it) and which is referred to as "the electronics network" ["filiere electronique"].

Whereas the concept of "network" should obviously be retained, some among its protagonists feel, however, that synergism is not enough if more progress

is to be achieved. The experience of the last few years has shown that technological development, through the productivity gains it brings about, will actually reduce the number of direct jobs and that competition, which now takes place on a worldwide scale, implies that, in addition to be financially strong, companies should also have a strategy.

That companies should be financially strong goes without saying. This is the object of the guidelines instructing nationalized companies in this sector to balance their accounts in 1985, and they should serve as an example as far as management rigor is concerned. That companies should have a stragegy is less obvious: witness the large software and systems houses whose profit margins are declining (this is not always due to the freeze of service prices). Operating contracts between the State and nationalized companies do indeed include clauses with respect to overall strategy; development contracts with private companies (approximately 200 this year) are written along the same lines. Therefore, a certain new bias is emerging and should confirm itself.

Rigor in management directly raises the issue of employment and productivity. When the plan of action for the electronics sector was initiated, it stressed the potential for job creation in this sector. Today, the situation appears to be seen in a different light. What was hardly perceptible three years ago has since been widely confirmed. The thrust of the microelectronics industry and its rapid technological development have resulted in considerable productivity gains affecting mainly employment. To remain competitive, a company must take this into account; the whole growth planned for companies in the electronics sector will be achieved with less people than before.

Simultaneously, another concept is emerging: around a new process or technology, new activities appear, and they will generate new jobs. This has already proved true for hardware, for instance with the Minitel display copiers, among others. But this trend is most apparent in the field of services. Retaining the example of Minitel, the number (and variety) of new services offered just this year is very significant.

We can also expect a generation of new services to accompany the integrated-services digital network and its environment, as well as the cabled network and plastic money.

And it is very interesting to note that services of this type are starting to be offered in the regions. Quite likely, this is the start of new operations that will generate jobs, but jobs that will be different from those lost by the industry.

At this stage of our observations, protagonists of the electronics sector are considering the best way to accompany the nascent industrial synergism (based on sound companies following strategies) to achieve stronger growth slopes. The main idea is to rely on large (present or future) projects that would still be the responsibility of the General Directorate of Telecommunications, and to develop all the potential private undertakings that could be grafted on them, especially in the regions. This development (costing less than is

assumed) would not only contribute to industrial growth (market expansion) but it would also bring about the creation of jobs (which was one of the primary goals of the plan of action for the electronics sector.

As a corollary to this approach--and this is already quite perceptible--we should achieve a fading out of state responsibilities in industrial management, accompanied by a consolidation of heavy state investments in large projects.

This approach was already being used before the Ministry of Post and Telecommunications took over responsibility for the electronics sector; the transfer accelerated this trend, as the General Directorate of Telecommunications never concealed it was not eager to meddle in the affairs of companies, even nationalized companies.

The emerging approach to development in this sector will certainly not lead to sensational plans. But it should take shape in light and successive touches. Its results will be assessed in time.

Although the Cabinet communique published last week mentioned a balance of the electronics sector, people at the Ministry of Post and Telecommunications prefer the words "taking stock." There is no doctrine and no bible for the plan for this sector, they like to say, but a series of provisions that are not hard and fast and, with state help, should make it possible to turn the electronics and data-processing industries into "one of the major orientations of the industrial redeployment policy undertaken by the government."

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SCIENTIFIC AND INDUSTRIAL POLICY

SCIENCE AND TECHNOLOGY CENTER BEGINS OPERATING IN SOUTHERN ITALY

Rome L'ESPRESSO in Italian 9 Dec 84 pp 237, 239, 241

[Article by Robert Fabiani: "Brain City"]

> [Text] In Valenzano, Bari province, Technopolis is about to be inaugurated. Some 500 researchers will work there. Companies such as IBM [International Business Machines], Fiat, Olivetti, and SIP [Italian Telephone Company] have been closely involved. The project is an ambitious one: to speed up the development of the South. How is it to be done?

Bari--It's called Technopolis; in Italian, "technology city." But it is not a city, it is a project with a name. At least that is what the person who originated it likes to call it. He is Aldo Romano, a kind of elemental force, big, tall, dynamic, a university professor of physics, an expert in data processing and computers, part philosopher like all physicists, and a bit of a kid in his love of puns. Technopolis is a true city with low buildings, streets, gardens, restaurants, tennis courts and evan a 48-room inn. It sprang up in a flash between early 1982 and mid-1984 in Valenzano, which is a farming community near Bari. It will be inaugurated on 10-11 December by 4 ministers, a bevy of officials and a delegation from the mythical land of California headed by that state's lieutenant governor. Two days of feasting will salute the realization of a dream, that of having the South, a traditionally backward region from all modern points of view, take part in the technological revolution, and a major part, at that.

This small citadel is isolated amid twisted olive and century-old carob trees; it is something unequalled in Europe today. When it is fully operational, it will have 500 researchers, financiers and industrialists, all of whom will be studying how better to use inventions from anywhere in the world, how to adapt avant-garde technology to specific needs, and how to transmit and spread knowledge of what is now the real strategic resource of the industrialized countries: technological know-how. Sounding a bit starry-eyed, the irrepressible Romano says, "How many in Italy in general and in the South in particular know the real possibilities of computers? We will tell anyone who wants to know. But we will do better: it is clear that computers are bought from American companies. It is an illusion to think that we can compete with those monsters. But it is not written anywhere that we cannot make better software than that supplied by the companies making those monsters."

Indeed, the "monster" was the first structure to appear in Technopolis when the city was still smelling of wet cement and varnish: a giant IBM capable of 11 million bits per second. At Technopolis, the capacities of the monster will be made available to the needs of individuals: does an industrialist want to streamline production, know the characteristics of a certain market or restructure his sales network? He goes to Technopolis and pays for the service, because even there technicians do not live on air; they will do a tailor-made job for him, whether his factory employs 3,000 people or 35.

Also, who in Italy knows what is happening in the far-off worlds of America and Japan? Technopolis will have its official spies in both places. When Silicon Valley invents a futuristic computer and Japan copies and improves it, the fact will be immediately reported to Valenzano, in Bari province. There, in suitably appointed study rooms with dozens of screens, laboratories and TV's, the innovation will be explained to whoever is interested, while a squad of specialists will go to work to find the best application for the invention, which is not always and not only what the inventor had in mind.

And more. Specialists are needed to make a business or even a government office function. Technopolis will receive them, organize courses for them, teach and indoctrinate them. This happened last year with personnel from Alfa Romeo and Alitalia, two officials of the Central Bank of Zaire, one from the Planning Ministry of Nicaragua, and one from the Treasury of Ecuador. All this did not happen in Technopolis, which did not yet exist, but at an office that was its progenitor, the study center for the Application of Advanced Technology. It was originated 15 years ago by, needless to say, the tireless Romano.

The physics professor had succeeded in having this baby grow up when he met Claudio Signorile, then the minister for the South and a Puglian, among other things. Signorile was a hard, unswerving collaborator, as was Andrea Saba, a Sardinian and president of the Institute for Aid to the Development of the South. Signorile and Saba became enamored of Romano's idea, and it was child's play to raise 20 billion lire to build Technopolis. They were fascinated by the physicist's fixed idea: thus far the Fund for the South had generously funded the visible infrastructure (roads, bridges, acqueducts). Now it was to create a knowledge infrastructure and bring about the culture of predicting tomorrow and the day after tomorrow. This, too, sounds a bit starry-eyed, but Romano is also something of a philosopher.

Keeping him in touch with everyday life is the job of Antonio Urciuoli, who, as a dairyman and president of the Bari Industrial Union, is someone who has his feet on the ground. According to Urciuoli, all the industry of the South can be classified as medium to small: the application of advanced technology makes for high costs and high added values. This is a problem that is quite well known in Puglia. Among the 1,000 businesses in Puglia, there are some, especially in the Barletta area, that seem to belong to another world. One factory makes plastic nets; it has 30 production lines that work by themselves without anyone to watch them. Another produces 6,000 pairs of shoes a day with 25 workers; the master operators are the computer and robot. Inevitably, people bring up the fact that this is taking place in a region where there are already 70,000 young people looking for a first job.

But this represents an idea within an idea, or, better, an observation based on an idea: throughout the world, the centers of technological research and the people studying the application of technology to the manufacturing industry have created as many jobs as the automobile industry did at the height of its splendor. For this reason, 180 hectares have been set aside around Technopolis for the installation of industries that will suckle the knowledge distilled in the citadel and immediately transform it into advanced, competitive production systems.

The first people to arrive have been high-caliber private businesses: IBM, which has launched a program to produce microcomputers; Fiat, which has built a center for computer-based planning; Olivetti, which already has a 120-employee data-processing center in Bari; and SIP, which can't get its telephones to work but is studying the best way to get into information-processing and telecommunications. And now the Americans are coming in from fabled Silicon Valley; this is the best guarantee that Aldo Romano's idea is right. Otherwise, would they have ever left their technological Eldorado to wend their way to Valenzano, in Bari province?

But Japan Beats All

Maybe Technopolis is the best European example of the technological city temple, but it is not the only one. Near Trieste, there is a concentration of laboratories doing pure research. There is also Technocity, an offshoot of such a weighty institution as the Angelli Foundation; it was formed for the purpose of putting order into the tangle of technological services offered between Piedmont and Lombardy. It will have the heart and brain of Gorgonzola. In the South, there are two important centers of research: one in Cosenza, where 60 researchers are still waiting to find out what they are going to work on, and another in Palermo, where the research center is housed in a former inn.

The best examples of technical cities come from abroad. The most famous is Science Park, in Cambridge, which is connected with the famous university and has ample room for industrialists who want to put their laboratory discoveries into practice. The university even rents its bells. Not even the French have been caught napping; they have created something like Technopolis on the Riviera (where the headquarters of the Technopolis International Club are also located). As usual, the Japanese are the past masters at this, if only in numbers: they have 19 technical cities scattered all over their country.

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SCIENTIFIC AND INDUSTRIAL POLICY

SIEMENS BUILDS NEW REGENSBURG, MUNICH PLANTS

Munich SIEMENS-MITTEILUNGEN No 10, 1984 pp 3-4

[Excerpts] In their recent meeting, the members of the finance committee were given an insight of achievements which are possible through common effort, though prosperity lent a helping hand. The main topic of the session was the Components Division which, after suffering through some extremely difficult years, is now in a most joyful phase: orders have increased by about 50 percent over those received last year; production is proceeding at a profit; the number of employees has not only stabilized, it has even increased by 7 percent. The "Mega-Project," which calls for an investment of DM 1.4 billion over the next few years, is a clear indication of the objectives to be reached.

According to several reports, large investments will be made within the framework of this project in Regensburg and in Munich-Perlach. In Regensburg, a highly efficient production location of the Components Division, a new plant is being built at a cost of DM 330 million; it is to start producing one-megabit memories in 1987. Construction work on the plant, which will provide about 250 high-tech jobs, started last September. In Munich-Perlach, construction has progressed farther; the development center is being enlarged there at a cost of DM 450 million. About 250 new employees, mostly engineers and natural scientists, some of whom have already been hired, will work there.

Another DM 800 million of development expenditures will be added to the funding of the four-megabit memory, which will require an investment of a similar order of magnitude.

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SCIENTIFIC AND INDUSTRIAL POLICY

PHILIPS OF NETHERLANDS IN 17 ESPRIT RESEARCH PROJECTS

Funds Total 1.9 Billion Guilders

Rotterdam NRC HANDELSBLAD in Dutch 10 Jan 85 p 11

[Article by Correspondent Dick Wittenberg: "European Information Technology. Philips in 17 Studies in ESPRIT Project"]

> [Text] Eindhoven, 10 Jan 85--Philips will participate in 17 research projects within the framework of ESPRIT, the European Strategic Research Program for Information Technology. All in all, the European Committee has approved over 100 projects; 40 large ones, 50 smaller ones, and some 10 test studies which still date back from the initial stage of ESPRIT.

An amount of approximately 1.9 billion guilders is involved in those projects. Half of this is being paid by the European Community, and the other half by business. Twice as much money, that is, 3.8 billion guilders, is available for the entire ESPRIT program. The remaining projects will be determined later. Philips will return with proposals for those projects also.

The Dutch electronics concern participates in 11 large projects, four smaller projects and two test projects. In these, it collaborates with some 50 different partners. Philips will invest around 80 million guilders in these studies during the coming five years. The number of Philips employees that is involved with these projects will gradually increase from 80 to 120 people, half of whom are working in the Netherlands.

Philips will act as primary contractor in three large projects. Together with Siemens, the Dutch firm is going to concern itself with the combination of different kinds of transistors on one single chip. A second project is aimed at unconventional computer structures. In this project, Philips will collaborate with AEG-Telefunken; CII Honeywell Bull; CSELT; GEC; and Nixdorf. A third study is to lead to improvement of the efficiency and the quality of software for industry. Partners are CGE [French General Electricity Company]; AT&T-Philips Telecommunications Belgium; a number of software firms; a German university; and the center for mathematics and informatics in Amsterdam.

The goal of the ESPRIT program is to make up, in 10 years' time, the European inferiority in comparison to Japan and the United States in the area of information technology. The program includes five areas which are of crucial importance to information technology: advanced micro-electronics; software technology; advanced information processing; office automation; and computer-directed production.

Cooperation Within ESPRIT

Rotterdam NRC HANDELSBLAD in Dutch 10 Jan 85 p 11

[Article by Correspondent Dick Wittenberg: "Philips Hopes That One Third of ESPRIT Projects Will Succeed"]

[Text] Eindhoven, 10 Jan 85--"I hope that afterwards, we will be able to say: one third of the projects succeeded, one third of the projects failed, and the rest of the research was nice to have done, after all. If that were the result, I would be very satisfied."

Dr Eng N. Hazewindus, head of the development coordination office of Philips, does not have excessively high expectations of ESPRIT, the strategic research program which is to help the countries of the European Community on in the field of information technology. He frankly admits that Philips would not be content with such a score if the research were to be done completely in-house. "In that case, I would want somewhat more certainty". But the price for cooperation just is a larger chance of failure.

"It is a gamble", Hazewindus says soberly. "The partners have different views and divergent company cultures. That entails risks. Moreover, the communication within a cooperative framework is always more complicated. It is harder to judge how good people are. Also, the danger is there that companies get different interests during the term of a project. They can withdraw from certain activities, or link up with companies outside of Europe".

Project leaders

Last year, industry has been able to gain experience with ESPRIT on a modest scale. In September of last year 36 test projects started up. Philips participated in six of these. During the test projects, it already soon appeared that the qualities of the project leader were of decisive importance to success. He has to make sure that discrepancies are overcome. He is responsible for coordination and for a good exchange of information. Hazewindus: "One study went excellently, because the project leader knew exactly what he was doing. Another project pretty soon went astray, because the leader was not up to his job".

Still, Hazewindus does not want to create the impression that the collaboration is only awkward and inefficient. He thinks it is very important that researchers of so many different companies get to know

one another. "That can be very stimulating. The element of competition will increase, because it is becoming clearer what everyone is doing".

In most of the 17 projects in which Philips ended up, the company took the initiative itself. First, it was defined in which areas of research the concern wanted to be active. Subsequently, a list was made of potential partners whom Philips would possibly, or would definitely not team up with. The technical expertise of the companies played the most important role in that consideration, Hazewindus says.

"Collaboration only makes sense with equivalent companies. Partners should be able to have something to offer to one another". The competitive position of the other companies was only looked at afterwards. In this respect, the question was asked whether they presented a danger to Philips, for instance because they had somewhat too strong links with companies outside of Europe. We would rather deal with companies which are somewhat removed from us than with direct competitors", Hazewindus says.

All in all, some 440 projects proposals were submitted to the European Committee. Under a 100 of these were accepted, which results in an average score of one in five. Philips' score is considerably higher. "Only about five of our projects didn't make it", Hazewindus says well pleased. "I only really regret that, at most, three of them did not come to fruition. We have done rather nicely."

Of course, not only scientific and industrial considerations played a role in the definition of the projects. Political arguments also were influential. For countries like Denmark and Greece do not have a national champion, concerns that play an innovative role in the field of information technology. Still, such countries could not possibly be left out of the framework of the ESPRIT program.

That is why part of the specialized research was placed with smaller companies and scientific institutions from these nations. According to Hazewindus, such tactical maneuvers have not resulted in a decrease in quality of the ESPRIT project. "I did not make an analysis of it, but when I glance over it, I find that the European committee has done a good job. The scientific recommendations have counted heaviest in decisionmaking".

Catching up and onward

The aim of the ESPRIT program has been set extremely high: in 10 years' time, Europe should have caught up with the big competitors Japan and America, or better still, have passed them by. The means which are available for such a drastic operation appear to be very modest. The total budget for the ESPRIT program amounts to 3.8 billion guilders for a period of five years. Philips spent approximately an equal amount for research and development in 1984 alone.

Still, Hazewindus does not wish to have the importance of the European strategic program played down. He points out that ESPRIT is totally aimed at "precompetitive research" and then still specialized in the limited field of information technology. "On the average, each project is worked on by some 20 people. That is very reasonable for such research. You really can do something with that. The objective of ESPRIT is to broaden the technological base of Europe. That should be possible with this set-up".

Hazewindus admits right away that the ESPRIT project by itself is not sufficient to catch up with Japan and America. "ESPRIT is a sum of quite a lot of strategies, not a joint plan of action of the European information technology industry. But all kinds of initiatives can grow from ESPRIT. It is not enough to do research together. The results will also have to be translated into business. That is what it is all about, after all".

"And then you inevitably come up against the fragmented European market, against the lack of standardization. You can not get around the problem that Europe has 10 to 12 companies which all make the same kind of products. Something will have to be done about that. ESPRIT by itself cannot be the solution. But ESPRIT can stimulate thinking about these problems".

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SCIENTIFIC AND INDUSTRIAL POLICY

BRIEFS

AEG TELEFUNKEN R&D INVESTMENTS--Overall R&D expenditures for the AEG Corporation will rise from DM 741 million in 1983 to more than DM 800 million in the current fiscal year. Almost DM 400 million of this will be allocated to the information and communications technology area. According the AEG Chairman Dr Hans Gissel, this means an 11 percent R&D share of annual sales for that division, which amount to about DM 3.6 billion. It has been learned that AEG employs about 6,000 people in R&D jobs, 500 of them in the research institutes in Berlin, Frankfurt and Ulm. [Text] [Duesseldorf VDI NACHRICHTEN in German 2 Nov 84 p 7] 9273

ESPRIT GRANTS FOR PHILIPS--Eindhoven, January 11--Dutch electronics giant Philips will receive some 80 million guilders subsidy from the European Community during the next five years for its part in 17 information technology projects, a Philips spokesman said last night. He said the projects, costing a total of 160 million guilders, would be carried out under the auspices of the European Strategic Programme for Research on Information Technology (ESPRIT). The community has promised to share the costs of the ESPRIT programme, expected to total 1,875 million guilders. Philips said fifty different partners were involved in the 17 projects for which it was to receive subsidy. Eleven of the projects could be considered major, the spokesman said. He said Philips would be working with, among others, AEG-Telfunken, Siemens, Honeywell Bull and Nixdorg. /Text/ /The Hague ANP NEWS BULLETIN in English 11 Jan 85 p 3/

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TECHNOLOGY TRANSFER

EUROPEANS VIE FOR AEROSPACE SALES TO CHINA

Paris AFP SCIENCES in French 8 Nov 84 pp 62-63

[Article: "Matra Signs an Agreement for Space Cooperation with China"]

[Text] Beijing--The Matra Company has signed an agreement for space cooperation with China, planning to arrange for training programs in France for Chinese technicians soon, according to Matra's Chairman and Managing Director, Jean-Luc Lagardere.

Lagardere indicated in a press conference that this agreement, signed between Matra and the Chinese Academy of Space Technology, applies to various areas of the space sector--in particular to technology transfer and should lead to a fruitful, long-term collaboration between China and France in this field.

The first stage of this agreement he pointed out, will be the organization of 6-month training programs in France in 1985, at the space installations of the Matra Company for 12 Chinese technicians and engineers. As they work alongside their French colleagues they will be able to familiarize themselves with Matra's space technology, "the most advanced in the world, outside the United States."

China, a space power, which has already successfully launched several satellites, "aims to accelerate its program of space development" particularly in the field of telecommunications, according to Lagardere.

Matra's CEO confirmed, moreover, that his firm was ready to make "very great efforts" to meet a Chinese call for the purchase of television satellites.

Several firms are in competition for a proposed purchase of 2 television satellites for China, Ford and RCA for the United States, Messerschmidt-Boelckow-Blohm (MBB) for the FRG [Federal Republic of Germany] and Matra for France, according to western diplomatic sources. Matra's reply to this call for bids, according to Lagardere, is "in the widest possible framework of technical exchanges."

According to observers, China is very partial to technology transfers which constitute an element of prime importance in its negotiations for cooperation and substantial overseas contracts.

A delegation from the MBB Company had accompanied Chancellor Kohl on his official visit to China last month, and, according to western diplomatic sources, they discussed in depth with the Chinese the possible sale by the FRG to China of telecommunications satellites and the building in common of telecommunications satellites.

"I believe especially in a long-term cooperation between France and China in the space field" emphasized Lagardere. "The possibilities of Franco-Chinese technological collaboration are very vast and will reach beyond the space field" he concluded.

The Matra firm specializes in the production of satellites, telecommunications, data processing and electronics, but also armaments, particularly missiles, which account for 50 per cent of its revenue.

During his stay in China, which started November 6, the Director of Matra met specifically Minister of Defense Zhang Aiping, and Minister of Astronautics Zhang Jun. Lagardere, heading a sizeable delegation of Matra directors, was to leave China November 9. Last August a Chinese delegation had witnessed the launching of a French satellite, Telecom 1, built by Matra. The launching took place on the Kourou site.

China entered the space era in 1970 with the launching of a 300kg satellite into an orbit close to the earth. Since then, it has taken part in 15 other successful missile launchings among these on April 8 last, a first telecommunications satellite in geostationary orbit.

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